DOCUMENT RESUME

ED 023 372 JC 680 369

Report of the Minnesota Inter-Institutional Television Feasibility Study.
Minnesota Univ., Minneapolis. Inter-Institutional Television.
Pub Date Jan 67
Note-200p.
EDRS Price MF-$1.00 HC-$10.10
Descriptors-Higher Education, *Instructional Aids, *Junior Colleges, *Televised Instruction, Television
Identifiers-*Minnesota

In 1965, the Minnesota legislature called for a feasibility study of inter-institutional educational television in higher education. Recommendations resulting from the study, with approval of the Statewide Advisory Committee, were: (1) empower the Liaison and Facilities Commission to manage the project and its funds; (2) provide each 4-year institution with a Wide Area Telephone Service (WATS) line and let each junior college share a WATS line with one other institution; (3) establish nine regional production centers; (4) establish two model interconnections; (5) provide funds for programing such material for both broadcast and CCTV; (6) maintain on-going evaluation of the program; (7) develop material in accordance with the policies of the participating institutions; (8) compensate faculty according to current salary and rank practices; (9) develop courses to prepare teachers in the use and preparation of TV instructional materials; (10) encourage private colleges to take part in the program; (11) support the Minnesota Educational TV Network in the development of a statewide capability; (12) develop a coordinated Minnesota library and data network; (13) establish specifications for compatibility of facilities and equipment; (14) encourage the Liaison and Facilities Commission to use the inter-institutional television development as a basis for further instructional cooperation. A table summarizes the expected costs of implementing these recommendations. (HH)

MINNESOTA INTER-INSTITUTIONAL TELEVISION

ED023372

Report of the Minnesota Inter-Institutional Television Feasibility Study

JC 680 369

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

REPORT OF THE MINNESOTA INTER-INSTITUTIONAL TELEVISION FEASIBILITY STUDY

Prepared by the Feasibility Study of
Inter-Institutional Television

University of Minnesota
Minneapolis, Minnesota
January 1967

UNIVERSITY OF CALIF.
LOS ANGELES

AUG 5 1968

CLEARINGHOUSE FOR
JUNIOR COLLEGE
INFORMATION

STATEWIDE ADVISORY COMMITTEE

Harry F. Bangsberg
President, Bemidji State
College (State Colleges)

Luther Brown
Director, Bureau of
Instructional Resources
St. Cloud State College
(State Colleges)

John E. Carroll
President, American Hoist &
Derrick Company
(Minnesota Liaison and
Facilities Commission)

H. C. Hanson
Superintendent, Rosemount
Public Schools (State
Department of Education)

A. A. Heckman
Executive Director, Louis W.
and Maud Hill Family
Foundation (Twin City
Area Educational
Television Corporation

Robert Holt
Professor, Political Science
(University of Minnesota)

F. Van Konynenburg
Executive Vice President
WCCO Radio and Television

Clifford Larson
Vice-President and Dean,
Bethel College
(Private College Council)

Donald Lavine
Rochester Junior College
(State Junior Colleges)

Hedi Oplesch
Foreign Language
Consultant, Robbinsdale
Public Schools (State
Department of Education)

Lewis C. Smith, Jr.
St. Cloud State College
(American Association of
University Professors)

Willard L. Thompson
Dean, General Extension
and Summer Session
(University of Minnesota)

Harry Webb
Head of Audio-Visual
Center, College of St.
Thomas (Private College
Council)

Stanley J. Wenberg
Vice-President for
Educational Relationships
and Development, University
of Minnesota (Association
of Minnesota Colleges)

Richard E. White
Assistant Executive Director
State Junior College Board

E. W. Ziebarth
Dean, College of Liberal Arts
(Twin City Area Educational
Television Corporation)

PREFACE

The Minnesota Television Feasibility Study was undertaken at the request of the State Legislature and this report has been prepared for legislative use. It is hoped that the Study will also be of value to the institutions of higher education as they develop plans for the use of educational communication.

The Study staff has prepared the body of the report and is responsible for its accuracy and content. The recommendations were prepared in draft form by the staff for consideration by the Statewide Advisory Committee. These were reviewed and revised during committee meetings. The final recommendations are therefore the joint endeavor of the staff and the Statewide Advisory Committee.

The authors are deeply indebted to the many people who have made it possible for this Study to be completed successfully.

--To the members of the Statewide Advisory Committee for their insights, diligence, gracious commitment of time, and their patience

--To Brother Josephus Gregory, Richard Hawk, Philip Helland, Duane Mattheis, Bevington Reed and O. Meredith Wilson, for their leadership in the development of management recommendations

--To those faculty members and administrators who worked to develop inter-institutional projects, with special thanks to Professors Albert Krueger, Kenneth Makinen, Gordon Meyers and Rex Sala for their special contributions to the Study

--To the members of the Television Coordinators Committee, who did so much to assist in the development of the engineering portions of the Study

--To the authors of the commissioned papers, who gave willingly of time to aid a study in another state

--To the Bureau of Institutional Research, University of Minnesota, who gave their support to the Study and made evaluations of each of the inter-institutional action projects

--To the leaders of educational television developments in other states, with special thanks to Larry Frymire of California, Glenn Starlin and Luke Lamb of Oregon, Hugh Green of Texas, Kenneth Christianson of Florida and Henry Cauthen of South Carolina.

--To Dr. Clair Tettemer of KFME-TV for his special assistance and his willingness to place on temporary leave Mr. Perry Schwartz to participate in the Austin-Rochester project

--To Oscar Reed of Jansky & Bailey for his flexibility and creativity in relating the engineering of television to the educational and inter-institutional needs of Minnesota

--To the many others who contributed generously of time and thought so that this Study of inter-institutional television could go forward

--And a very special "thank you" to our staff of whom we are very proud:

Walter Bachman
Horace Chope
Carol Johnson
Marjorie Johnson
Michael Seery
Jean Seguin
Kathy Sporlein
Laurie Trombley
John White

Paul H. Cashman
Edward R. McMahon

TABLE OF CONTENTS

Page

SUMMARY OF DATA AND RECOMMENDATIONS 1

  Summary--Findings and Relevant Data. 1
    Bibliography. 1
    Inventory of Television Facilities and Utilization Within Minnesota 2
    Engineering Study 3
    Inter-Institutional Action Projects 5
    Commissioned Papers 6
    Assessment of Television Developments in Other States 8
    Patterns of Television Management 9
  Recommendations of Statewide Advisory Committee and Study Staff 10

Chapter I: INTRODUCTION. 1

Chapter II: SURVEY OF THE LITERATURE. 1

  Current Uses of Television in Education. . . . 2
  Educational Communications Technology. 6
  Television's Instructional Effectiveness . . . 9
  The Role of the Faculty in Television Instruction 14
  Costs of Instructional Television. 18
  Inter-Institutional Television 21

Chapter III: METHODS OF APPROACH TO THE PROBLEM. 1

  Bibliography and Library Development 4
  Inventory of Television Facilities and Utilization 4
  Visitations and Phone Interviews 4
  Engineering Study. 5
  Inter-Institutional Action Projects. 7
  Commissioned Papers. 9
  Educational Management Discussions 10
  The Context of the Study 12

Chapter IV: RESULTANT DATA. 1

  Bibliography and Library Development 1
  Inventory of Television Facilities in Minnesota 2

Page

Assessment of Television Developments in Other States. 8
  Oregon State System for Higher Education. . 9
  Texas Educational Microwave Project 15
  Florida Educational Television Commission . 19
  Other Related Television Developments . . . 22
  Management Developments in Other States . . 28

Engineering Study. 33
  Available Educational Communications Systems 34
  Transmission and Distribution Systems . . . 36
  Identifying Suitable Methods of Transmission and Distribution 40
  Securing Transmission and Distribution Facilities 41
  Existing Telecommunications Systems in Minnesota 43
  Space Satellites. 45
  Communications Needs of Minnesota Higher Education. 45
  Engineering Recommendations 48

Inter-Institutional Projects 52
  Metropolitan Junior College-University of Minnesota. 53
  Mankato State College-Austin Junior College 60
  St. Cloud State College-Mankato State College. 66
  Austin Junior College-Rochester Junior College. 72
  Bemidji State College-Renown Properties Computer 80
  Concordia College (Moorhead)-University of Minnesota. 82
  Unfunded Inter-Institutional Projects . . . 83
  Other Related Television Developments in Minnesota. 86
  Costs of Instructional Television 93
  Institutional and Academic Schedules. . . . 100

Commissioned Papers. 103
  Inter-Institutional Networks. 103
  New Communications Technology and Its Relationship to Instruction. 107
  Responsibilities, Rights, and Incentives for Faculty With Respect to Televised Instruction. 111
  The Relationship of Elementary and Secondary Education to a State Communications Network Serving Higher Education 113

Use of Copyrighted Material for Instruction Through Inter-Institutional Distribution by Television. 116
Federal-State Relationships 119
Educational Management Discussions 126

Appendix A: ENABLING LEGISLATION

Appendix B: REPORT OF ACTION PROJECTS

Appendix C: COMMISSIONED PAPERS

Appendix D: ENGINEERING STUDY REPORT - Jansky & Bailey

Appendix E: ENGINEERING SPECIFICATIONS - Jansky & Bailey

Appendix F: MANAGEMENT CONSIDERATIONS BY ADMINISTRATIVE HEADS OF MINNESOTA SYSTEMS OF EDUCATION

Appendix G: BIBLIOGRAPHY

TABLES

Table Number		Page
1	Pattern of Television Developments in Minnesota Institutions of Higher Education.	IV- 3
2	Programming and Facilities at Minnesota Educational Television Stations	IV- 6
3	Status of State Television Systems, December, 1966. .	IV-30
4	Wide Band Multipurpose Duplex Microwave Service . . .	IV-51
5	Minnesota Television Feasibility Project Metropolitan Junior College/University of Minnesota - Reading and Vocabulary.	IV-94
6	Minnesota Television Feasibility Project Metropolitan Junior College/University of Minnesota - Anthropology 2A	IV-95
7	Minnesota Television Feasibility Project Austin Junior College/Mankato State College.	IV-98

FIGURES

Figure Number		Page
1	Metropolitan Junior College Project	IV-96
2	Mankato State College/Austin Junior College Project .	IV-99

SUMMARY OF DATA AND RECOMMENDATIONS

Following the research phase of the Study, the staff summarized the data from the inter-institutional projects, engineering study, commissioned papers, available literature, inventory of facilities and management discussions.

The summary of data which follows is the one considered by the Statewide Advisory Committee in their last two meetings with minor modifications in wording suggested by the Committee. The recommendations follow from the data gathered and suggestions of the Advisory Committee. References are made to sections where supporting material will be found. It should be kept in mind, however, that data regarding each recommendation is located in several sections of the report. To obtain all of the relevant data a complete reading of the report will be useful.

The recommendations which appear in this section were endorsed by the Statewide Advisory Committee.

Summary--Findings and Relevant Data

Bibliography

There is a substantial inventory of printed materials and research available in the area of instructional television. However, much of this material has become dated and a substantial portion of the research has only limited value because of insufficient controls used in the experimental situation. A considerable number of the entries in the bibliography are no longer available or in print, in spite of relatively current publication dates (as recent as 1962 and 1963). More than 95 per cent of the bibliography is now held in a permanent collection developed by the Study.

Inventory of Television Facilities and Utilization Within Minnesota

Studio type production facilities at institutions of higher education include a substantial development at the University of Minnesota, Minneapolis, offering 89 courses during the past academic year and relatively modest installations at Mankato State College and Macalester College. Virtually all the state colleges and several of the private institutions have some type of limited closed-circuit television available for image magnification and student-teacher observation. Other than for the projects developed as part of the Feasibility Study, there is little television activity of an inter-institutional nature.

Earlier attempts (for example, an economics course developed among the private colleges) have been relatively unsuccessful. There are perhaps two notable exceptions at the current time: The Twin City diploma schools of nursing operated by private hospitals are cooperating through the facilities of KTCA-TV in televised teaching of academic courses, and Carleton College in Northfield participates with other institutions in the Associated Colleges of the Midwest in utlilizing a mobile television unit for development of teacher education materials.

Presently colleges and universities are more inclined to use television to serve individual needs than to use television inter-institutionally. During the Fall Quarter the University of Minnesota utilized the broadcast facility of KTCA-TV in the amount of 7.5 hours per week, with some of these programs also broadcast at KWCM-TV, Appleton, and WDSE-TV, Duluth. St. Cloud State College continues an eight-year program of production of one course each quarter over Channel 2, KTCA in Minneapolis-St. Paul. The College also produces a course using the facilities of the commercial station at Alexandria. State Colleges at Mankato and Moorhead produce courses over broadcast facilities in their respective areas. Concordia College (Moorhead) utilizes broadcast facilities of KFME for English and German courses on a credit basis. A number of private colleges offer a variety of community and cultural programs. None of these, however, carry college-level credit. Several institutions reported that funding of additional television programs from current operating monies is not possible at this time.

Engineering Study

Visitations to twenty-one institutions of higher education provided insight into the type of inter-institutional cooperation and communications services that are of greatest interest to the colleges and universities. Included in a decreasing order of preference are: electronic interconnection of libraries to expedite inter-library loans for the sharing of printed material; electronic interconnection for the sharing of data and to provide access to sophisticated computers; development of specifications for small closed-circuit and video taping systems; development of specifications for intra-campus closed-circuit production and distribution facilities; access to regional production centers; development of audio interconnection between institutions of higher education; access to broadcast television facilities; wideband interconnection for electronic exchange of television.

Institutions expressed interest in the development of regional production facilities that could at some later date be interconnected when significant amounts of instructional materials are available. Initially, video tape materials could be exchanged by surface transport of tape or through off-hour broadcasts of program materials for off-the-air pickup and recording at participating institutions. Direct classroom viewing of courses offered on broadcast television will also have application. However, problems of scheduling might suggest the need for several playbacks of the same material or the use of local video tape recorders.

A statewide video band microwave interconnection would be difficult to justify at this time based on projected levels of traffic. However, all electronic communications systems, exclusive of television, could be accomodated by cable interconnection for some period of time.

Convenient access to broadcast facilities is expected to increase as the Minnesota Educational Television Network continues to expand.

A number of suppliers are available and interested in providing microwave interconnections including the Twin City Area Educational Television Corporation, Northwestern Bell Telephone, Minnesota Microwave, K & M Electronics, and others.

Inter-Institutional Action Projects

Inter-institutional cooperation in the use of television materials developed through a number of feasibility projects including Metropolitan Junior College-University of Minnesota, Mankato State College-Austin Junior College, St. Cloud-Mankato State Colleges, Austin-Rochester Junior Colleges, Bemidji State College and Renown Properties (computer interconnect) and the University of Minnesota-Concordia College.

Experimental action projects supported the following findings: (1) students generally respond favorably and accept inter-institutional television instruction in the same manner as that developed on their own campus; (2) faculties see value in using inter-institutional television but believe greater provisions should be made for their participation in program development; (3) increased participation in the production and planning results in a more favorable attitude by faculty; (4) faculty believe that policies regarding control of inter-institutional television and compensation should be more clearly defined; (5) state college and junior college faculties can effectively produce material for inter-institutional television; (6) distribution of televised lessons by closed-circuit local playback of video tape or broadcast has no observable effect on the acceptance of instruction by students or faculty; (7) undergraduate students can manage operation of portable video taping equipment on a reliable and long-term basis; (8) remote access to a high capacity computer is a usable and feasible instructional tool.

In effect, these findings suggest that inter-institutional cooperation in the use of instructional television is feasible. The action projects confirm other data developed by the Study indicating the limited experience of the institutions of higher education in using television instructionally.

Commissioned Papers

To provide objective and expert knowledge in a number of areas the Feasibility Study commissioned papers to be prepared by nationally-recognized authorities. Dr. Fred Siebert noted that proposed copyright legislation would allow all types of copyrighted materials to be used "live" in the classroom but would curtail the use of materials for broadcast and recording. An amendment to the bill would allow two copies of an educational program to be made using copyrighted materials and allow these copies to be used for a period of five years.

Dr. Siebert will supplement his paper shortly after the first of the year reflecting the changes anticipated in further congressional action. It is significant that Dr. Siebert's paper refers to an area that is in the process of legislative change. It would seem at this time that, in a practical sense, most materials now available for inter-institutional television (e.g. films, still pictures, graphs, and text materials) would require clearance from the publisher and producer under the proposed legislation.

Dr. Charles McIntyre in his paper on faculty rights and responsibilities suggests that institutions, departments and faculties need to share the responsibility for the development of television materials. Initiation of inter-institutional television should be in the hands of individual faculty members and academic departments. He noted that while the able and creative faculty member logically makes the best television teacher, the same individual has many alternative ways of spending his time. In many instances, these alternatives are more remunerative in terms of self-satisfaction, professional advancement and monetary rewards. McIntyre suggests more consideration for the role of the faculty as well as a higher level of compensation for those who participate as television teachers. He further recommends that budgetary adjustments revert to departments, recognizing changes in staff and instructional costs which result from the use of television.

Dr. Chester Babcock reviewed the potential of elementary and secondary education in a network serving higher education.

Dr. John Witherspoon, writing about educational communications systems, proposes that any new television development include provision for data, audio, slow-scan television, facsimile, and etc. He develops the concept that the sharing of resources between institutions needs to be on a much broader basis than can be provided by television alone and many times at a considerable savings in cost.

Dr. John W. Bystrom, in a paper concerning Federal and State relationships considers the role of federal support in the development of educational television and radio in the United States. He points out that federal funds have also been available for research and development projects that have been directed to solving some of the problems.

Assessment of Television Developments in Other States

As a basis for the evaluation of existing inter-institutional television systems, on-site visitations and conferences were held with management and operational personnel for inter-institutional television systems currently operating in Oregon, Central Texas, and Florida.

In Oregon and Texas, much of the enthusiasm faded as operational problems and obsolete materials became increasing concerns of faculty and administration. The Oregon system is now almost exclusively a service for elementary and secondary instruction, while Texas is attempting to rebuild on a broader base of management which includes greater faculty participation and more funds. In Florida, a rather loosely knit consortium of broadcast television systems, funded in part by the State and operated by public schools, junior colleges, and community corporations, has responsibility for programming materials for the junior colleges. This system apparently operates at a relatively consistent level offering several courses per quarter for virtually all of the county junior colleges.

On-site visits to South Carolina, Chicago, California, and Maryland served to illustrate that the availability of college courses, equipment and television personnel will not in themselves bring about inter-institutional television development. South Carolina, with a closed-circuit system serving every county in the State and a statewide broadcast system has had only one course taught for credit by an institution of higher education in the last eight years. Chicago City Junior College, having offered courses for the last ten years through its Television College branch, has yet to have these courses used inter-institutionally. The situation may change in the relatively near future as thirty-one of the courses have been made available to other institutions through the Great Plains Tape Library in Lincoln, Nebraska.

The ingredients necessary for broad acceptance and significant use of inter-institutional television have not been identified. There was little evidence gained from existing systems that total courses on television developed by one institution for use by another had little likelihood of achieving a significant level of acceptance until both faculties and institutions have had a greater base of experience with using television instructionally. It would seem from the experience of other systems that a format which includes a higher level of faculty participation, good quality and convenient production facilities, and a sufficient body of television material to support a meaningful program of exchange has the greatest promise for future development in inter-institutional television.

It should be noted that problems may arise when a system makes use of materials developed elsewhere. Status becomes a significant factor as the relative importance of the institution, its faculty, or administrative function come into question.

Patterns of Television Management

A pattern of management of statewide television seems to be emerging in the form of designated educational television commissions or committees. Forty-five states currently have such bodies functioning. Normally these agencies operate as independent units, or are established within existing state educational authorities. Typically, the commission has responsibility for coordinating and funding of educational television activities. Community-owned stations tend to participate on a voluntary basis.

In Minnesota, the heads of the state systems of higher education, meeting at the request of the Statewide Advisory Committee, recommended that the Liaison and Facilities Commission assume responsibility through a television committee for the development of inter-institutional television among the colleges and universities of Minnesota. The committee would have responsibility for the development of facilities, funding of inter-institutional programming and the coordination of the system. Individual institutions and academic departments would hold responsibility for development of courses and initiation of programs. Credit earned by students through television courses would be accepted by other institutions as any other credit would be accepted.

Recommendations of the Statewide Advisory Committee and Study Staff

The following recommendations based on the findings of the Feasibility Study are intended to support the simultaneous and balanced development of the instructional materials, management and facilities necessary to the effective use of inter-institutional television. Enabling legislation for the Minnesota Feasibility Study requested a review of inter-institutional television instruction and preparation of recommendations for a plan of action. The law that initiated the Study encompassed the following:

> "an evaluation of the educational needs emphasizing but not limited to the University, state colleges, and state junior

> colleges which might be effectively and efficiently served by the inter-institutional use of televised instructional materials."

The law also provided for:

> "the preparation of a report summarizing the findings of the study and recommending to the State Legislature the most appropriate program for developing the educational materials, facilities, and policies which will provide the most effective and efficient inter-institutional use of televised materials."

Therefore, the recommendations presented are concerned with the inter-institutional development of television among institutions of higher education. These recommendations directly follow from the enabling legislation and are not intended to serve as a State blueprint for all educational television. In this connection, it should be underscored that full cognizance is taken of the mission and resources of all existing educational television and educational communication systems.

The recommendations calling for appropriations are listed first for legislative convenience. However, it should be noted that those following are of equal importance.

1. To provide for the orderly development of inter-institutional television instruction, the Liaison and Facilities Commission should be requested to assume responsibility for management of inter-institutional television in Minnesota. The scope of this responsibility should include state funding for facilities (e.g. production studios, cable and microwave interconnections, etc.) which would be used inter-institutionally, funding of inter-institutional television programming and all necessary direction and coordination. The Liaison and Facilities Commission should be empowered to receive and

manage such federal funds as might become available to it for inter-institutional television. Therefore, an amount of $178,000 should be appropriated for the biennium to the Liaison and Facilities Commission for the funding of necessary management and technical personnel required to undertake this responsibility.[1]

2. To support increased communication and cooperation among the public institutions of higher education and to serve as a basis for the development of future inter-institutional relations, these institutions should be interconnected to transmit computer data, voice and to expedite the sharing of library resources. The proposal would provide each of the four-year institutions with full access to a statewide WATS (Wide Area Telephone [redacted] Service) line. Each of the junior colleges would share a WATS line with one other institution. Estimated cost for the complete system with audio and limited data capability is $156,000 per year or $312,000 for the biennium. Additional teletypewriter and display capability at each institution would cost $25,000 per year or $50,000 for the biennium. Therefore, an amount of $362,000 should be appropriated for the biennium to the Liaison and Facilities Commission for the funding of the communication system.[2]

---

[1] Chapter IV, pp. 28, 30-32, 126-129. Appendix F.

[2] Chapter IV, pp. 45-48, 69-70, 70-80, 80-81, 107-111, 125-126.

3. To encourage the development of televised instructional materials and to place production facilities in close proximity to educational resources and faculties, nine regional production centers should be established at the state colleges and outstate campuses of the University of Minnesota. Such centers would be designed to serve the initial intra-institutional needs of the resident institution, and those of the junior and private colleges, as well as to provide facilities for inter-institutional production. The production centers might well be made available to the elementary and secondary schools to serve other educational purposes to the extent that the capability of the facilities permit. Institutions serving as regional production centers would have responsibility for providing adequate space and partial staffing as determined by the Liaison and Facilities Commission. The managing institutions should contract with state and private colleges or guarantee a fixed amount of production time. Specific procedures for determining access to production centers should be determined by policies established by the Liaison and Facilities Commission. The managing institutions should be permitted to cooperate with others in the joint development of facilities wherever the institution finds this in the best interests of their instructional programs. Therefore, an amount of $1,498,500 for nine production centers (each costing $166,500) should be appropriated for the

biennium to the Liaison and Facilities Commission for equipment and operation.[3]

4. To provide needed experience for institutions of higher education, a model interconnection should be established to accommodate television and educational communication activity between the University of Minnesota-Minneapolis, University of Minnesota-Morris, and Southwest State College, as well as a similar connection between the state colleges at Mankato and Marshall. Consideration should be given to the addition of a state junior college to the microwave model. If arrangements can be made, the microwave model also might well include KWCM-TV, Appleton. Therefore, an amount of $113,634 should be appropriated for the second year of the biennium to the Liaison and Facilities Commission for funding the microwave interconnection, and supporting library equipment and personnel.[4]

5. To encourage the development of television materials on an inter-institutional basis, funds should be provided for the programming of such materials for broadcast and closed-circuit distribution. This inter-institutional program development project should be administered through the Liaison and Facilities Commission. The Commission will make grants to institutions submitting proposals for the cooperative development of television courses, related instruction and materials. Therefore,

---

[3] Chapter IV, pp. 4-5, 13-15, 45-49, 126-129.

[4] Chapter II, pp. 6-7. Chapter IV, pp. 18, 27, 45-47, 49, 107-111, 125-126.

an amount of $500,000 should be appropriated for the biennium to the Liaison and Facilities Commission for funding this recommendation.[5]

6. To maintain an on-going evaluation of inter-institutional television and to provide new information relative to improving instructional effectiveness, a continuing program of research should be conducted. Therefore, an amount of $60,000 should be appropriated for the biennium to the Liaison and Facilities Commission for the funding of such research.[6]

7. To maintain the academic integrity of television course offerings, materials produced cooperatively by institutions of higher education should be developed in accord with the policies of the participating institutions. Faculty responsibilities relative to inter-institutional televised instruction should be the same as those for conventional instruction. Implementation would require that faculty from the participating departments and institutions assume the principal role for the planning, development and evaluation of inter-institutional television instructional materials with appropriate administrative support. Faculty and institutions should share the responsibility for updating video tape materials in keeping with the best interests of students. Faculty rights and interests relative to the inter-institutional

---

[5] Chapter IV, pp. 45-46, Interest shown in inter-institutional action projects is also a basis for this recommendation.

[6] Chapter IV, p. 10, Recommendation also based on request of Advisory Committee.

use of television should include: utilization of recorded instructional materials, updating of such materials, restriction of unauthorized use of video recordings, right of withdrawal and provision for the television instructor's control of distribution. Further recognition of this special effort should include provision for released time, additional compensation, residual rights, and production and clerical assistance.[7]

8. To encourage participation of the most able individuals, faculty should be compensated for their efforts as television teachers in accordance with policies which fully recognize current salary and academic rank. Because of the special time and professional demands required for the production of effective television instruction, faculty should likewise be compensated for the reuse, updating, and overall supervision of such television instructional materials. Budgetary adjustments should revert to departments, recognizing changes in staff and instructional costs which result from the use of television.

A number of groups and institutions are currently developing policies affecting the use of television for instruction. For this reason, it is recommended that the Minnesota Liaison and Facilities Commission work toward defining policies for inter-institutional television, taking into account institutional position statements as they become available, as well as the statement now under development by the American Association of University Professors, and the commissioned paper dealing with this area by Charles McIntyre.[8]

---

[7] Chapter IV, pp. 17-18, 57, 70, 107, 111-113.

9. To provide a broader base of understanding and experience in the use of television for professionals working at all levels of education, the University of Minnesota and state colleges should be encouraged and assisted to develop courses of study for the preparation of teachers in the use of instructional television and the training of television production specialists.[9]
10. To serve the best interests of all students in institutions of higher education, the private colleges of Minnesota should be encouraged to participate in the inter-institutional communication developments within the provisions of the laws and the Constitution of the State of Minnesota.[10]
11. To extend the instructional and cultural advantages of broadcast television to all areas of the State of Minnesota, the Minnesota Educational Television Network should be supported in the development of a full statewide capability and encouraged to give recognition to the unique instructional resources and personnel available at each of the institutions of higher education.[11]

---

[8] Chapter IV, pp. 57-58, 111-113.

[9] Chapter II, p. 12. Chapter IV, pp. 13-14, 77.

[10] Chapter IV, pp. 2-8, 45-47, 126-129.

[11] Chapter IV, pp. 2-8, 36, 43-44, 45-47, 122-123.

12. To make maximum use of electronic interconnection, institutional librarians, directors of computer centers, and representatives of the Minnesota State Department of Administratiom should be encouraged and assisted to consider development of a coordinated Minnesota library and data network which would include higher education.[12]
13. To provide for compatability of facilities and equipment, specifications should be established cooperatively by institutions of higher education working through the Liaison and Facilities Commission.[13]
14. The Liaison and Facilities Commission should be encouraged to use inter-institutional television development as a basis to further study of instructional cooperation.[14]

A table summarizing the costs of implementation of the above recommendations can be found at the end of this section.

The above recommendations are intended to allow colleges and universities to participate in inter-institutional developments to the extent that their participation serves higher education without jeopardizing their primary responsibility to serve students. Preservation of the right not to participate--as well as to participate--in inter-institutional instruction should make the recommendations a strong contribution to the capability of higher education to serve the State.

---

[12] Chapter IV, pp. 45-47, 108-111, 125-126.

[13] Chapter IV, pp. 42, 46.

[14] Chapter IV, pp. 60, 66, 72, 80. Interest shown in the inter-institutional action projects and support of the Advisory Committee are also a basis for this recommendation.

COST SUMMARY OF RECOMMENDATIONS

	1967-68	1968-69
Liaison and Facilities Commission (Operation and Management)	89,000.00	89,000.00
WATS (Wide Area Telephone System)	156,000.00	156,000.00
Teletype Unit	25,000.00	25,000.00
Regional Production Centers	1,000.000.00	498,500.00
Model Interconnection and Operational Support (Minneapolis/Morris/Marshall/Mankato)		113,634.00*
Inter-Institutional Development Project	250,000.00	250,000.00
Continuing Program of Research	30,000.00	30,000.00
ANNUAL TOTAL	1,550,000.00	1,162,134.00
GRAND TOTAL		2,712,134.00

* Includes $50,000 for supporting staff, equipment, library and computer materials.

CHAPTER I

INTRODUCTION

The development of educational television for instruction has usually taken place on the strength of one or more of the following assumptions: (1) instructional television offers a way to combat the high costs of instruction by extending the influence and use of a good teacher in a time of teacher shortage and by making the use of institutional space more efficient; (2) instructional television offers a method by which to distribute the scarce educational resources of a state so as to use them more effectively by making instructors available to more students without diluting teaching; (3) instructional television offers a means by which to enrich the curriculum and the out-of-classroom experiences of students.

It is not surprising that members of the 1965 Minnesota State Legislature should have become aware of these assumptions. Nor is it surprising that the Legislature should have wished to know whether or not these assumptions are accurate. If they are accurate, immediate implications for the development of educational television for instructional purposes become apparent. If the assumptions are not accurate, any plan to establish within the State a costly and educationally unjustified system is unwise.

With these concerns in mind, the 1965 Minnesota Legislature passed legislation calling for a feasibility study to determine the potential usefulness of inter-institutional educational television as a service to higher education within the State. The legislation clearly called for the following: (1) an examination of the educational factors, so as to assess the potential educational usefulness of a state inter-institutional development and the kinds of problems which must be solved before a development could be successful; (2) an examination of the engineering questions, so as to determine the kind of engineering plan which would be necessary to serve the educational specifications which might develop during the study; (3) a set of recommendations for development which might serve as a guide to the Legislature, higher education and the State of Minnesota in the years ahead.

This study has been developed on the assumption that educational questions are paramount. Three major questions have been asked: (1) What kinds of meaningful inter-institutional relationships and communication must exist before joint use of electronic communications can be developed effectively? (2) Does television have a role to play in higher education in an inter-institutional way, or is its role primarily intra-institutional? (3) How may television be used effectively on an inter-institutional basis?

Some related questions also are significant. What should be the role of faculty and students with respect to inter-institutional educational television? What pattern of development should take place to provide inter-institutional instruction? Does equipment alone provide an inter-institutional educational television system? What constitutes "effective coverage" of the State of Minnesota for inter-institutional instruction by institutions of higher education?

What seems clear from experience in other states is that much equipment is available. In Minnesota, for example, there is an excellent broadcast network.

In Oregon, a broadcast system blankets the State. This system was established at a cost of about $500,000. Funds were made available from Federal, state and private sources. An excellent staff was employed. Yet, eleven years later, the use of higher education of this system is minimal.

In Texas, a microwave path covers a considerable section of the State. Eleven institutions originally agreed to work with the organization on (TEMP) which was to manage this system. Gradually, from a high point of nine courses offered on television, the use of the system declined until today, only three courses are offered. In the last few months, under careful analysis of the educational problems to which the system must be responsive, the Texas system is beginning to show new vigor.

An elaborate system of interconnection, both broadcast and closed-circuit, exists in South Carolina. Yet that system--offered without charge--is unused by higher education at present.

The experience in other states also suggests strongly that the development of inter-institutional television inevitably involved the whole area of electronic communication. A broad-band interconnection carrying television can transmit many other things: audio circuits which allow faculty and administrators to talk to one another, teletype, data interchange through computers, slow-scan television, and so on. Institutions might consider some kinds of interconnection useful, and yet might not see the need for other kinds of interconnection. A careful assessment of all forms of electronic interconnection had to be undertaken as a part of the study.

Finally, it is important to recognize in a study of this kind that the technology is continually changing, and a system devised at this time must be sufficiently flexible to accommodate communication requirements of the future. An ideal system, from an engineering point of view, is not the same today as it was in 1955, nor can one assume that the technology will not continue to change in the years immediately ahead. A study of the feasibility of educational television must recognize the need to provide enough flexibility so advantage can be taken of new developments which would affect the nature of the inter-institutional system employed within the State.

The 1965 Minnesota State Legislature recognizing some of the preceeding considerations made a decision to undertake a feasibility study within the State in order to have a clearer picture of the direction which might serve the best interests of the citizens of Minnesota, the educational institutions to whom the State looks for leadership and the students who deserve the highest quality of education that the State of Minnesota can afford to give.

This study was undertaken in an effort to seek out that direction requested by the Legislature, and the legislative request has been a constant guide to the staff of the Study and to the Advisory Committee in their research and deliberations.

It is important to note that the problems in getting the Study underway, notably the assembling of a full study staff and taking care of the necessary consultation with other institutions meant that the first phase of the Study actually began in January of 1966.

The report that follows is intended to be as brief as possible, with the supporting data to follow in the appendices. The report includes the recommendations made by the Study in which the Statewide Advisory Committee joins. It is hoped that they form the basis for developments which will be of value to the State of Minnesota in strengthening its educational capability through electronic communication.

CHAPTER II

SURVEY OF THE LITERATURE

The literature on television and its uses for education and instruction is, by any measure, voluminous. Literally hundreds of books, pamphlets, and articles have been written during the past decade concerning this instructional medium.

Given such a vast field of literature, one would suspect that the task of any survey of the literature would simply be to state concisely the results of the many studies. However, the study prescribed by the legislature--the feasibility of utilizing television on an inter-institutional basis in higher education--is quite specific, and much of the available published material does not directly relate to this topic.

An attempt will be made to give an overall picture of the use of instructional television in institutions of higher education and to relate the findings to the inter-institutional uses.

This chapter will deal with six basic areas of the literature: (1) current use of television; (2) educational communications technology; (3) television's instructional effectiveness; (4) the role of the faculty in television instruction; (5) the costs of instructional television; (6) inter-institutional television.

Current Uses of Television in Education

All television could be considered educational since the viewer learns new information regarding a variety of subjects. The terminology ETV and ITV are explained in this manner by Carpenter and Greenhill:

> "Instructional Television is understood to refer to educational efforts using television which have as their purposes the production, origination, and distribution of instructional content for people to learn; efforts in which television is used as the principal or as an auxiliary medium of communication. This conception includes closed-circuit television, limited range broadcasts and even extended broadcast activities which handle information specifically organized and produced for learning. . . The scope of instructional television is more specific than that of educational television and very different from commercial television. In brief, instructional television is closely related to the work of organized formal educational institutions." [1]

While many television spokesmen make a distinction between educational television and instructional television, John Schwarzwalder of KTCA-TV, refers to this viewpoint as one of several "myths" connected with ETV. Schwarzwalder feels that the average educational television viewer, as well as the student in the classroom, benefits from the presentation of information in a better organized manner (such as in the classroom situation) and from the availability of the "great minds" of educational institutions.[2] Murphy and Gross point out as a limiting factor the inability of instructional television to bring to its viewers the range of cultural and public affairs programs available to most ETV channels through such services as National Educational Television.[3]

---

[1] C. R. Carpenter and L. P. Greenhill, "Facilities for Instructional Television," in Educational Television: The Next Ten Years (Stanford, 1962), p. 286.

[2] John C. Schwarzwalder, "Myths of Educational Television," National Association of Educational Broadcasters Journal (May-June 1965), pp. 59-60.

[3] Judith Murphy and Ronald Gross, Learning By Television (New York, 1966), p. 9.

A discussion of ETV and ITV leads directly to consideration of closed versus open-circuit television. The demands by educational institutions for television access at specific times have necessitated the combined use of broadcast and closed-circuit programming. A conference sponsored jointly by the American Council on Education and the State University of Iowa in 1956, considered the question of closed-circuit instructional television. In summarizing the first day's session Mr. Steetle made the following comments:

> "Dean Martin from the Case Institute of Technology cited the flexibility of closed-circuit TV: it diminishes the tendency toward long-winded descriptions and permits engineering instructors and students to get down to practical 'show-how' demonstrations. John Schwarzwalder reminded us that closed-circuit and open-circuit are complementary and not competitive. There were courses on the University of Houston station KUHT that he thought might very well be better as closed-circuit courses. He said that from now on Houston would be thinking in terms of both open and closed-circuit operations." [4]

Instructional television has been used most extensively as a supplement to the classroom teacher in elementary education. More than 80% of the students considered to be enrolled in television courses are found at this elementary education level. College and university students account for less than one per cent of the enrollment in television courses. These percentages do not reflect accurately the number of hours or the more advanced course level of college versus elementary level enrollments, but they are indicative of the general pattern of substantial usage at the grade school level, less usage in the high school and much diminished use at the college level.[5]

---

[4] Ralph Steetle, Teaching By Closed-Circuit Television, Report of a Conference Sponsored Jointly by the Committee on Television of the American Council on Education and the State University of Iowa (Washington, D. C., 1956), p. 39.

[5] Lawrence E. McKune, National Compendium of Televised Instruction, Volume 12 (East Lansing, 1965), p. i.

This pattern of development is comprised of both broadcast and closed-circuit instruction. Factors which may determine, in part, the use of closed-circuit or broadcast television are: the size of the institution, location, the faculty, and available building space. In 1965, 22 broadcast TV stations were engaged in televised education of students in higher education institution, with a total of 124 ETV broadcast stations around the country. "Closed-circuit systems were reported by 82 universities, 54 colleges, 66 school systems, 9 institutes, 2 seminaries, and 4 state departments."[6]

Extensive educational demands for broadcast television channel allocations have exceeded the number available. In an attempt to resolve this problem the FCC, in 1963, made available the Instructional Television Fixed Service, using low-power, relatively inexpensive equipment. This system, sometimes referred to as the "2500 megacycle" service, enables users to operate a multi-channel broadcast system outside of the conventional broadcast ban which can only be received on specially designed equipment at specific locations. Currently 32 channels have been allocated to this service. Eleven transmitters are on the air, while another 44 allocations are pending utilizing 257 transmitters.

Regarding the potential utilization of television in the educational process, Gordon lists three possible types of uses. First, television may be used as a supplement to provide enrichment in a particular course. Second, television may be used as a form of "team teaching," with the television teacher providing a portion of the course and the classroom teacher providing the remainder. Third, television may assume the total teaching function, in which case, only the television teacher is involved.[7]

---

[6] McKune, p. iii.

In addition to these general areas of usage for television, the medium may perform a number of functions which are not directly connected to the instructional process, but are essential to the educational institution. For example, video tape recorders have made possible the following uses of television at the Pennsylvania State University:

> "1) Research on such subjects as the examining of speech defects, 2) Training students in television techniques, 3) Recording and analyzing performances of teacher trainees, 4) Conferences and workshop projects, 5) Presentation of special lectures, and 6) Recording and self-evaluation of teaching performances by faculty members."[8]

Tarbet also mentions the potential use of television in the student orientation program, the registration of students, and for expansion of library services.[9]

Television has been used in the University classroom for laboratory demonstrations in chemistry, for observation purposes in the teaching of child psychology and teacher training courses, and in medical and dental schools for instructional purposes.

Educational television has been utilized as an instructional aid since 1958 in South Carolina, utilizing both open and closed-circuit transmission. Closed-circuit programs are sent to schools, colleges, and hospitals by cable, which will eventually provide simultaneous transmission on multiple channels. The open-circuit programs are transmitted by microwave interconnections. The ETV network sees its function not as a competing educational agency but as an additional resource to instructional institutions and further hopes to be able to bring a broad range of educational programming for all citizens, whether in schools, colleges or for adult education.[10]

---

[7] George N. Gordon, Educational Television (New York, 1965), p. 66.

[8] McKune, p. iii.

[9] Donald G. Tarbet, Television and Our Schools (New York, 1961), p. 153.

Educational Communications Technology

Potential uses by educational institutions of rapidly developing technology far exceed their actual application. However, any study of television feasibility would be incomplete without some consideration of these factors. Full use of transmission facilities may make existing facilities less expensive as well as making possible a wider range of additional future services. According to Witherspoon a variety of uses can be expected:

> "A circuit of sufficient bandwidth to transmit broadcast-quality television can allow sophisticated computers to hold electronic conversations, and if not otherwise employed can transmit audio, slow-scan TV, facsimile, teletype, and simple data services simultaneously."[11]

The report of the North Central Association of Colleges and Secondary Schools considers educational television as a "blender" which would integrate the presentation of all communications media. The closed-circuit facilities in schools could become a part of an audio-visual system utilizing such aids as programmed texts, language laboratories and library reservoirs.[12]

---

[10] South Carolina Educational Television Network, Emphasis on Quality (September 1966).

[11] John P. Witherspoon, "The Educational Communications System," Audio-visual Instruction (January 1966), p. 11.

[12] North Central Association of Colleges and Secondary Schools, Two Depth Seminars on Current Status, Continuous Census, and Projected Uses of Television in Education for the Next Decade (1965), p. 68

A growing number of studies and projected plans are being developed in schools all over the country dealing with the use of new technology and the feasibility of electronic interconnection. A study by the National Association of Educational Broadcasters of the interconnection needs of colleges and universities utilizing a network of multi-purpose electronic media has resulted in the development of model systems. The intra-state model, proposed for use in Oregon, would provide inter-institutional use of electronic media for instructional exchanges, administrative and management procedures, for use in continuing education programs, in cooperative library operations, and for location and retrieval of research data.[13]

The computer, according to Coulson has not had widespread use in the schools as yet and may continue to have limited usage but is valuable as a tool for educational training and research.[14] According to Kurland, the learning pace of the student can be adjusted with computer assistance to meet his capacity:

> "Moreover, once programs are developed for learners of different capacities, it should become possible to understand the obstacles to learning and to develop more effective strategies for helping learners at all levels to learn more and better. It is even conceivable that the difficulty of some slow learners may derive from an inherent incapacity for manipulation of verbal symbols. Machines permit the presentation of non-verbal stimuli--pictures, diagrams, or even things--and thus may make educable individuals who now appear to be uneducable." [15]

---

[13] National Association of Educational Broadcasters, Educational Communications Systems Phase III (Washington, D. C., 1966).

[14] John E. Coulson, "Computer-Based Instructional Systems," The Automation of School Information Systems (Washington, D. C., 1964), p. 93.

[15] Norman D. Kurland, "Stay-At-Home Classrooms for Space-Age Adults," in Automation, Education, and Human Values, ed. William W. Brickman and Stanley Lehrer (New York, 1966), p. 255.

Transmission systems may soon make available to television a wider span of programming with the advent of domestic satellites. A proposal has been made by the ABC Network to the FCC for permission to institute such a system and the Ford Foundation has submitted a proposal for a system of synchronous satellites operated by a non-profit corporation to be used by all TV stations.[16]

The prospect of the use of satellites for educational intercommunication throughout the United States as well as for instructional exchanges throughout the world has been discussed by educators. The head of ABC believes that ground stations will be used and has asked NBC and CBS to join in the effort to secure transmission by domestic satellite for use in transmission of commercial television programs.

The Ford Foundation proposal was thought of as a way to aid non-commercial TV while bringing to commercial TV viewers the advantages of satellite transmission. The cost of satellite transmission operated by a non-profit corporation would provide a savings of approximately $45 million per year over the amount presently paid to American Telephone and Telegraph. It is the view of the Ford Foundation that this money or a portion of it could be used for establishing a non-commercial national network with "a new level of excellence" in programming. The plans call for informational, cultural and instructional television.[17]

Students of educational innovation, as reported by Murphy and Gross, have observed the time lag between the development of technological

---

[16] Murphy and Gross, p. 79

[17] The Ford Foundation, Establishment of Domestic Non-Common Carrier Communications-Satellite Facilities by Non-Governmental Entities (New York, 1966), p.3.

"hardware" and utilization in the classroom, sometimes estimated to be as much as ten or fifteen years.[18]

Television's Instructional Effectiveness

Most researchers considering the effectiveness of televised instruction would agree that, for the most part, both televised and conventional teaching methods have proved to be equally effective. Even in the most conservative studies, verification can be found of little significant difference.

Perhaps the most comprehensive study dealing with the effectiveness of television as compared with face-to-face instruction consists of a thesis written by Stickell. His work is an investigation of previous reports dealing with the effectiveness of televised instruction, including an extensive review of the work of Wilbur Schramm as well as thirty other studies. Stickell eliminated in his evaluation those studies which compared unmatched groups, nonrandom selections, and took into consideration such factors as the ability of teachers used in each method, the grade level and subject matter, and mobility of subjects, as well as a number of other related criteria. He concludes:

> "When considering only those studies which were judged interpretable, there are no contradictory results. Although the data are quite limited, it seems safe to say that neither the televised nor the face-to-face mode of instruction has demonstrated a superiority as measured by achievement tests."[19]

---

[18] Murphy and Gross, p. 43

[19] David White Stickell, A Critical Review of the Methodology and Results of Research Comparing Televised and Face-to-Face Instruction, (University Park, Pennsylvania, 1963), p. 66

Thus, Stickell substantiates the common conclusion in studies of television's effectiveness that there is "no significant difference"between the student's achievement in a television course as compared with an ordinary lecture.

To further examine the "no significant difference" finding, Catherine Williams recommends further research into the differences between the teaching done by both methods as opposed to research of television as a media used for instruction. She considers the conditions regarding the television course, the selection of a particularly competent teacher given adequate preparation time, assisted by curriculum and audio visual aids. Professor Williams suggests comparing these factors to those of the traditional classroom where teachers with varying degrees of effectiveness and supplementary aids can be found.[20]

It is the view of Carpenter that:

> "Educational measurements are relative and not absolute. The problem is to assess the effectiveness of instructional television with reference to the effectiveness of some other established and accepted pattern of instruction."

A poor teacher using televised instruction will not become a better teacher through use of television nor will the use of television make a good teacher any less effective. Carpenter further concludes that television, itself, as a variable is of minor significance.[21]

---

[20] Catherine M. Williams, "Reexamination of 'No Significant Differences' that ITV Studies Report," Audio Visual Communication Review (July-August 1962), pp. 263-65.

[21] C. R. Carpenter, "Research on Instructional Television," Conference on the Economics of Educational Television (Waltham, Massachusetts, 1963), p. 9

Research on the effectiveness of televised teaching is limited by variables which cloud the resulting picture. According to Jones, these variables can be categorized as those regarding the learner, the learning environment, and motivational variables.[22]

When the question of effectiveness of inter-institutional television arises, two statements are directly pertinent:

> "It has also (been) shown that inter-institutional television teaching compares favorably with conventional classroom instruction if the criterion for comparison is the relative achievement of students as measured by examinations." [23]
>
> "The preponderant conclusion to be obtained from these extensive studies is that institutional origin *per se* of a television course, utilized on an inter-institutional basis, does not affect student achievement." [24]

Issuing a work of caution as to the interpretation of these studies of television's effectiveness, Wilbur Schramm states:

> " . . . instructional television has been at least as effective as ordinary classroom instruction, when evaluative instruments have been employed. Use of standardized tests begs the question of whether the intangibles of TV teaching are as beneficial as those of ordinary classroom teaching . . . "

However, using these normal measures of effectiveness, Schramm finds trends in the conclusions of numerous studies in this area. The table below lists the findings of 393 studies of instructional television at all grade levels. Interpretation of these findings, of course, is subject to the limitations mentioned at the beginning of this section.

---

[22] J. Charles Jones, "Learning Theory and Instruction," from National Association of Educational Broadcasters *Conference on Learning and Television* (Washington, D. C., June 27-July 15, 1966), p. 29.

[23] Glenn Starlin and John E. Lallas, *Inter-Institutional Teaching by Television in the Oregon State System of Higher Education* (Eugene, Final Report, 1964), p. 34.

[24] Starlin and Lallas, Final Report, p. 11.

	TV More Effective	No Significant Difference	TV Less Effective	Number of Studies
Grades 3-9	33%	56%	11%	203
High School	13	63	24	90
College	3	84	13	100

The general trends indicated by this table illustrate that television is more likely to be an effective instructional medium in the lower grades than in either the high schools or colleges.[25]

Student and faculty attitudes regarding television may not reflect a true picture of its effectiveness as a teaching tool. Faculty attitudes tend to reflect their pattern of involvement with the media, those having the least experience exhibiting the most indecision as to its value. In a 1961 University of Minnesota survey of faculty regarding closed-circuit televised teaching some rather contradictory results developed. Of those replying to the questionnaire 47.4% expressed a favorable reaction to televised instruction, 63.2% agreed that CCTV was an effective medium for transmitting concepts and ideas, 75.8% admitted that TV was an effective medium for transmitting facts and information, 78.9% believed that it would greatly increase visibility of demonstrations and experiments, but only 13.7% were enthusiastic about trying this method of instruction, with an additional 22.4% willing to try it.[26]

Gordon states that while college students seem less enthusiastic about televised instruction, studies have shown that students under certain circumstances (e.g. home viewing) have reacted favorably and that certain professors and courses evoked a more favorable reaction than others.[27]

---

[25] Wilbur Schramm, "Learning From Instructional Television," Review of Educational Research, Volume 32 (April 1962), p. 158.

[26] University of Minnesota, Bureau of Institutional Research, Faculty Attitudes Toward the Use of Closed-Circuit Television in University Instruction (Minneapolis, 1961), p. 9.

The Chicago City Junior College has been involved in televised instruction through their "TV College" since 1956 and has studied the problem of the TV college student extensively during this time. It was found that while the student who was an "at-home viewer" consistently outperformed full-time day students, the former were older and better motivated. Further investigations comparing the older, better motivated students at home and on the campus revealed that:

> ". . . TV in-class students of college age could not be expected to match the performance either of at-home viewers or conventional classroom students without supplemental classroom instruction. Added confirmation came from another quarter. Investigation disclosed the uniformly lower performance of teen-aged TV concurrent students (students taking a television course at home and attending conventional classes in the same term) in their television classes as opposed to their performance in conventional classes." [28]
>
> "Our studies demonstrate that well-motivated students can learn, say, Spanish or Russian as well by TV as they can by conventional classroom instruction, provided the televised instruction is reinforced by drills led by a 'live' instructor."[29]

At the college level, classroom interaction seems to be more important to the student. The college student may see personal contact with the professor as an aid to pursuit of his career goals. Schramm states that:

---

[27] Gordon, p. 90.

[28] Chicago Public Schools, Eight Years of TV College: A Fourth Report (Chicago, 1964), p. 23.

[29] Chicago Public Schools, p. 26.

> "In addition to this, students at the higher levels typically are aware of unfavorable faculty attitudes toward television. The college teacher, in particular, is threatened by the idea of having his classroom opened up to critical eyes. He sometimes regards colleagues who are successful on television as showmen, rather than scholars. These attitudes are communicated to students, and it is not surprising that motivation at the higher levels has sometimes been less than in the early grades or in the case of home students." [30]

The Role of the Faculty in Television Instruction

It has been argued that the introduction of television to the educational community may alter the traditional role of the faculty to a certain extent. Tyler summarizes such changes in the following manner:

> "The introduction of instructional television into the classroom forces the teacher to redefine his instructional role . . . . Basically, the teacher has two professional roles which cannot be discharged by mass media, electronic devices, or teaching machines. He is a manager of learning situations and a counselor of individual learners . . . It is clear that once teachers see their appropriate roles in the classroom as involving basically the management of learning situations and the counseling of individual learners, they no longer look upon television as a threat."[31]

In the college community, this change in faculty roles may thus result in greater concentration by the television instructor in preparing and delivering the course and consequently greater concentration by other faculty members on counseling students, reviewing students' written assignments, or leading smaller class sections or seminars.

---

[30] Wilbur Schramm, "What We Know About Learning From Instructional Television," in Educational Television: The Next Ten Years (Stanford, 1962), p. 68.

[31] I. Keith Tyler, "The Impact of Instructional Television on Teaching Roles and Functions," Audio Visual Communication Review (January-February 1962), pp. 54-56.

The use of television on an inter-institutional basis creates additional types of problems in the consideration of the changing faculty role. When television is used inter-institutionally, one or more institutions may originate a particular course which is used by others. Since effective instruction depends upon the full-fledged cooperation of all institutions and faculty members involved, previous efforts at providing inter-institutional instruction have stressed the importance of the role of faculty members in making decisions pertaining to instructional exchanges. A report of the Oregon experiment with inter-institutional television states that:

> "Any program which requires acceptance and cooperation from personnel employed at different institutions of higher education demands an administrative structure which permits representatives from each institution to participate in decisions made which affect all institutions." [32]

Another significant inter-institutional effort now in operation is the Texas Educational Microwave Project (TEMP). After several years of operation, TEMP has come to recognize and respect the role of faculty members in planning television programs. A recent publication of TEMP states:

> ". . . the beginning of a new philosophy for TEMP operations has centered around maximum involvement of faculty in making decisions concerning the production, utilization, and evaluation of instructional television."
>
> "The key to effective utilization of TEMP is the involvement of the classroom teacher, the academic administration, and the general administration of the member institutions in their accustomed area of activities." [33]

---

[32] Glen Starlin and John E. Lallas, Inter-Institutional Teaching By Television in the Oregon State System of Higher Education, Report No. 1, 1957-1959 (Eugene, 1960), p. 67.

[33] Texas Educational Microwave Project Newsletter (Austin, September 1965).

Another excerpt from the report of the Oregon experiment is useful for providing insights into the many problems which inter-institutional television adds to simple intra-institutional use of television:

> "Many subject areas were considered by faculty members to be unadaptable to televised instruction, and consequently, there was little possibility of experimentation in those areas." [34]
>
> "Some departments were concerned about merely receiving a televised course lest this would militate against their professional status as a department and lessen their prestige. There are certainly a number of intangible factors of status and prestige which are confounded with origination or reception of televised courses on on inter-institutional basis." [35]

The rights of faculty members in regard to preparation of televised courses presents a complex problem with many questions to be considered, such as: determination of course content, responsibility for updating, dissemination of the course, and "authorship" rights. An additional factor is the time required by the teacher to prepare the course--how will he be compensated? This may be handled by reducing his teaching load to allow the extra time required or by some type of financial arrangement. Actual practice among institutions of higher education varies, but most colleges and universities allow a certain amount of released time or extra salary compensation for faculty members for the preparation of televised courses. The amount of released time allotted is tailored to the needs of the particular institution, their staffing problems, the type of course to be prepared and funds available for programming. [36]

---

[34] Starlin and Lallas, Report No. 1, p. 10.

[35] Starlin and Lallas, Report No. 1, p. 11.

[36] National Educational Association, Proceedings of the Conference on Professional Rights and Responsibilities of Teachers in Relation to the Newer Educational Media (Washington, D. C., March 15-17, 1962), p. 36.

Courses may be recorded by several methods, most of which can be protected by copyrights much the same as a textbook. As a result of consideration by the House Judiciary Committee, during the 89th Congress, a proposed bill, H. R. 4347 was amended and reported out of committee for further action. If passed, this legislation would mark the first revision of the Copyright Law since 1909. Provisions of the bill would spell out more clearly than the present law the rights of those participating in the use of electronic media but would not solve many of the problems brought about by rapidly developing technology.[37]

Under existing laws, legal ownership of video tape has been difficult to establish, according to Siebert:

> "It (video tape) is not a film, but a magnetic tape, its contents are not immediately visually observable, and it requires a complex machine to make it observable. The Copyright Office has accepted video tapes for copyright, but very few have been submitted for registration.
>
> . . . .
>
> "There are no court decisions on the question of the copyrightability of a video tape."38

The American Association of University Professors has stated some specific concerns of the professor in regard to faculty rights.

> "A Recording of a teacher's presentation in the traditional classroom setting, whether for reuse on educational television or for any other reason, should be made only with his consent and his prior knowledge as to the precise nature and purpose of the recording."
>
> "Provision should be made for faculty control over the future use and distribution of a recorded course of television instruction and for periodic review by the original teacher-author, or by an appropriate faculty body to determine whether it should be revised or withdrawn from instructional use because of obsolescense." 39

---

[37] 89th Congress, Second Session, U. S. Congressional Record, Volume 112 (September 27, 1966), p. 23116.

[38] Fred S. Siebert, Copyrights, Clearances, and Rights of Teachers in the New Educational Media (Washington, D. C., 1965), p. 15.

[39] American Association of University Professors, Draft Statement of Principals On Educational Television, p. 4.

While this situation may seem favorable to teachers, many colleges and universities as well as the National Education Association feel that the situation changes when the teacher is commissioned to teach a televised course and that the product then becomes the property of his employer. Regarding the question of ownership Siebert states:

> "From our survey of the educational field in answer to the question of who owns the television program, kinescope or videotape, more than 80 per cent of the replies from all institutions indicated that ownership was in the educational institutions rather than in an individual." 40

We have observed that television, and more specifically, inter-institutional television, may alter the role of the faculty member and create novel problems within the educational community. Since television has not reached a level of continous operation on an inter-institutional basis, it is difficult to prescribe the exact role of the faculty. However, the conclusion in relevant literature seems to indicate that the faculty must play a significant role in all phases of the operation and that every effort must be made to elicit the cooperation of individual faculty members.

Costs of Instructional Television

This section will not attempt to specifically analyze the costs of various types of television transmission,but will simply review the statements and findings of previous cost studies. Perhaps the most significant question facing the educator is the cost of the medium relative to the benefits which it provides. Several studies have been conducted at the college level on this topic, and they furnish indices which are helpful in considering the cost factor within the educational

---

[40] Siebert, p. 8.

institution. The crucial determinant of costs for television is the "break-even point," the point at which the cost per credit is the same for conventional and televised instruction. This "break-even point" varies from school to school and with the types of courses compared. Such factors as student enrollment, the use of related materials, the use of outside production assistance, and broadcast or transmission costs must all be considered. Attention must also be given to the type of discussion that will accompany the televised portion--is the entire course to be televised or only a portion, will discussion be handled by a professor, an instructor, or a student. Two college level studies of closed-circuit instruction reviewed the question of the break-even point:

> "Thus, it may be concluded that unless there are qualitative gains in instruction or other advantages, the use of closed-circuit television for teaching in a context similar to that of Penn State will be found to be feasible for courses of more than 200 students." 41
>
> "It can also be seen that an instructional cost advantage might be gained through televised instruction in those courses which have large student enrollments and which could provide from 150 to 270 students or more for simultaneous instruction."[42]

The cost analysis done by Pennsylvania State University in 1958 which breaks down figures into unit costs seems to be the most comprehensive study of this kind. While more recent figures would be valuable they do not seem to be available. The following table will give educators and legislators some insight into unit costs:[43]

---

[41] C. R. Carpenter and L. P. Greenhill, Instructional Television Research, Report Number Two (University Park, Pennsylvania, 1958), p. 105.

[42] E. I. Siebert, Cost Estimates and Comparisons for Televised and Conventional Instruction, TVPR Report Number 7 (Purdue University, 1958), p. 6.

[43] C. R. Carpenter and L. P. Greenhill, Report Number Two, p. 103.

COMPARISONS OF STUDENT-CREDIT-UNIT COSTS OF CONVENTIONAL AND TV INSTRUCTION

Course	Total Students Fall	Total Students Spring	Total for Academic Year	Course Credits	Total Student Credit Units	Net Cost Conventional	Net Cost TV	Difference
Psychology	575	651	1,226	3	3,678	$6.04	$3.99	$2.05
Accounting	220	209	429	3	1,287	6.60	5.84	.76
Sociology	169	297	466	3	1,398	7.35	5.38	1.97
Air Science	810	810	1,620	2	3,240	15.43	6.96	8.47
Totals	1,774	1,967	3,741		9,603			
Student-Credit-Unit Cost Averages						$9.48	$5.44	$4.04

In general, instructional television has not fulfilled the premature predictions of some educators and broadcasters as being the ultimate solution to the problem of increasing enrollments in higher education. Television has proved its usefulness and financial feasibility in some, but certainly not all, college courses or areas of study. The following excerpts from different sources indicate the guarded optimism which still prevails regarding instructional television:

> "It (instructional television) is not a 'money-saving' device, but it is employed rather as a 'man-saving' device for it multiplies the availability of their outstanding faculties to a larger number of students." 44

> ". . . television has the potential to become an effective tool in education. It is not magic. It will not necessarily improve quality or decrease costs of instruction." 45

A further factor that clouds the question of costs involves the effect that the scheduling of large classes has upon efficient utilization of costly laboratories and other facilities. In discussing costs Siebert states:

---

[44] J. G. Paltridge, Educational Television in the Leading Universities of The United States (University of California, Berkeley, 1962), p. 15.

[45] Starlin and Lallas, Final Report, p. 38.

> "It is, therefore, suggested that block scheduling of hundreds of students always be examined for its effects on other parts of the instructional program. Even though the television facilities may be adequate to accommodate very large numbers simultaneously, this will not inevitably be the most prudent choice." 46

Inter-Institutional Television

Three major systems of inter-institutional television in higher education are presently in operation--Florida, Texas, and Oregon. A fourth venture just underway in inter-institutional cooperation is a program in New York City, over station WNYC-TV, planned by the Council of Higher Educational Institutions (CHEI).

This program is the result of a year of research and demonstration in inter-institutional television including faculty orientation and planning for eventual broadcast of instructional materials. The schedule for the fall 1966 semester included three courses available to CHEI institutions: History of Latin America, General Psychology and College Humanities. Program plans were developed with the aid of courses obtained through the Great Plains Instructional Library prepared by various colleges and one course prepared by the State University of New York.

The Higher Educational Council is an association of 46 colleges and universities in New York City. Colleges in this viewing area plan to make use of these programs in a variety of ways: for direct

---

[46] Warren Siebert, "Economics of Instructional Television," Two Depth Seminars on Current Status, Continous Census, And Projected Uses of Television in Education For the Next Decade, Report of North Central Association of Colleges and Secondary Schools (Columbus, 1965), p. 227.

instructional purposes, for supplementary study, or for faculty in-service training. At this time there are still some factors inhibiting development of the plan among compact institutions.[47]

The Oregon inter-institutional system, after seven years of experimentation, is now planning only one course during the 1966-67 academic year. The Texas system (TEMP), mentioned earlier, is still in operation but has undergone numerous alterations in the composition and structure of constituent membership in the system. A report of their reorganization plans states:

> "A new organizational plan for TEMP. . . calls for control of policy, finance and public relations by the Board of Trustees and control of program planning, scheduling, and half of TEMP's total budget by a Program Planning Council composed of the member institutions." 48

Nine faculty committees met during the during of 1966 to assess the previous television offerings of TEMP and the potential for the future. In the fall of 1966 three courses were offered, as well as supplementary programs, from National Educational Television (NET). The NET programs included among other offerings, concerts of major symphony orchestras and a series of programs featuring contemporary poets.[49]

Florida's inter-institutional development has been primarily at the junior college level. With adequate faculty planning and evaluation, it is apparently succeeding. The lack of literature concerning this project makes evaluative statements difficult.

---

[47] Jack McBride, ed., Cooperative Instructional Television Demonstration Program and Service, Report: New York City Council of Higher Educational Institutions (New York, September 1965-August 1966).

[48] Texas Educational Microwave Project Newsletter (Austin, September 1965).

[49] Texas Educational Microwave Project, Tentative Schedule--Fall 1966.

The Great Plains Regional Instructional Television Library, one of three regional libraries of recorded instructional materials was funded in 1962 under Federal grants to serve twelve Midwestern states. Materials are available for all educational levels. The 92 page catalog of recorded instructional courses for 1967 contains a special section featuring thirty-one Chicago TV College courses available with study guides. The Library, working under the auspices of the University of Nebraska Television Department is directed by a thirteen member policy board representing the various educational levels.[50]

Information regarding the current status of inter-institutional television is limited. Failure to use inter-institutional television can hardly be attributed to the lack of television equipment, interconnections, or hardware. Many states have developed television systems and have the potential for inter-institutional usage directly at hand, but none has succeeded in developing reasonably effective cooperative programs.

Oregon's extensive experiment involving inter-institutional television concluded:

> "Over a seven-year period of operation, however, willingness to utilize inter-institutional television existed only on an experimental basis; there has been little evidence of desire or determination to continue inter-institutional television instruction on a regular basis." 51
>
> "Those who experienced inter-institutional television teaching, including those who taught on it, seemed to conclude that the extra work and time and coordination necessary to adjust to the program's disadvantages outweighed its advantages. Taken in its separate aspects advantages can be demonstrated. Taken in its entirety, the extra work and time required to adapt to

---

[50] Great Plains Instructional Library, A Catalog of Recorded Television Courses (Lincoln, 1967).

[51] Starlin and Lallas, Final Report, p. 34.

> television, to make contacts with other institutions, and to coordinate the television lectures with the discussion sections, involved more effort than seemed to be worthwhile in terms of demonstrable results or in terms of television's potential for improved instruction, redeployment of faculty, etc. There was no evidence that inter-institutional television contributed significantly to the improvement of instruction--a basic objective of the project--nor was there evidence that inter-institutional television could result in greater economy. Coupling the administrative and coordinative problems of an inter-institutional program the introduction of televised instruction proved too much of an innovation for ready acceptance." 52

> "Organized differently, with the expanded use of video tape in a manner which could minimize the coordinative-administrative details, television teaching on an inter-institutional basis could find more acceptance and utilization." 53

The latest report of the Texas Educational Microwave Project, after a two-year cooperative experience which included both public and private schools at the junior and senior college level, concludes as follows:

> "Such disparities as religious affiliation, size, traditions, concept of mission and symbols of status were of moment, but offered no barriers to effective organization." 54

> "What TEMP has shown is that this inter-college network can operate with shoestring facilities but that such operation has more crises in it than are good for well-ordered academic pursuits." 55

It cannot be clearly determined if participation in TEMP contributed to improvement in instruction at the cooperating colleges. However, current developments and increased commitments would indicate that the participating institutions see potential in the system.

---

[52] Starlin and Lallas, Final Report, p. 36.

[53] Starlin and Lallas, Final Report, p. 37.

[54] Texas Educational Microwave Project, Final Report (Austin, July 1963), p. I-9.

[55] Texas Educational Microwave Project, Final Report, p. I-13.

The effectiveness of television for performing certain functions is indisputable--the value of television as a suitable medium for learning is firmly established. The application of this medium to inter-institutional television while holding promise has not as yet successfully shown how it can be used extensively to solve the problems of higher education.

The Carnegie Commission on Educational Television is conducting an extensive study of non-commercial television and will issue a report in January of 1967. This study should be a useful guide to the future development of educational television and its place in instruction.

CHAPTER III

METHODS OF APPROACH TO THE PROBLEM

In response to the legislation calling for a study of inter-institutional use of educational television, the University of Minnesota appointed a committee of University faculty and staff with the following responsibilities: (1) To develop the initial plan of the Study; (2) To assure fiscal responsibility; (3) To employ the Study staff; (4) To provide assistance to the staff in the development of the Study.

Dr. Paul H. Cashman, Assistant Vice President for Educational Relationships and Development at the University of Minnesota, and Professor Edward McMahon, Chairman of the Department of Audio Visual Education at Mankato State College, were selected as Director and Associate Director of the Study.

The University Planning Committee recommended the creation of a Statewide Advisory Committee composed of representatives of interested institutions and agencies. At the request of President O. Meredith Wilson of the University of Minnesota, representatives were appointed from the following agencies: (1) Minnesota State Colleges; (2) Minnesota State Junior Colleges; (3) University of Minnesota; (4) State Department of Education; (5) Minnesota Private Colleges; (6) American Association of University Professors; (7) The Board of Trustees, Twin City Area Television Corporation; (8) The Minnesota Liaison and Facilities Commission. The responsibilities of the Statewide Committee were defined as follows: (1) to advise the staff regarding the conduct of the Study; (2) to consider major decisions for the Study, including the selection of an engineering firm and the recommendations in the final report; (3) to provide liaison between the Study staff and the institutions and agencies represented in the Statewide Committee.

Throughout the Study, the Statewide Advisory Committee met regularly to discuss the Study and to give guidance to the staff as necessary.

Early in the development of the Study, it became apparent that certain terms needed definition in order to clarify the scope of the Study. The following terms are defined as used throughout this report.

Television: The transmission of live, film or picture images and audio signals in various forms to a receiver, for the purpose of communication. The term includes broadcast television, closed-circuit television, small television cameras and recorders as used for in-school functions, such as for image magnification, teacher observation, diagnostic and remedial applications. As applied to the Study, the term also includes other educational communication services (such as voice, teletype, facsimile, and data) which may be accommodated by television transmission systems.

Feasibility Study: An investigation to determine the types of inter-institutional television developments which will assist colleges and universities in carrying out their instructional responsibilities to the State. At an early point in the Study, it was determined that sufficient evidence exists showing that television can be used effectively for instruction. The practicality of television for inter-institutional purposes is less certain, and it is with this aspect of educational television that the Study is concerned.

Inter-Institutional: In establishing the scope of the Study, the staff included all types of educational television systems that might be used by two or more institutions of higher education. The Study did not concern itself with materials produced by one institution for its own consumption. However, television produced by a single institution which might be available for use by other institutions, as well as that which was developed jointly by two or more institutions was included within the scope of the Study.

It is important to recognize that no comprehensive study of inter-institutional television could be made without consideration of the implications of the many related electonic communication systems that are available. It is significant that the same system which accommodates television can also be used for library exchange, data, voice, and a number of other purposes which relate directly to inter-institutional communication. All of them have an impact upon the cost of electronic inter-connection and all of them have some of the same implications for educational cooperation among institutions. Hence the Statewide Advisory Committee determined it was essential that all applications of electronic interconnection be considered in the Study.

In order to develop data which might be used to formulate recommendations for the long-term development of inter-institutional educational television within the State of Minnesota, the Study staff, with the support of the Statewide Advisory Committee, undertook a number of specific activities. The resultant data gathered will be included in the next chapter. However, the rationale for each of these phases is important to an understanding of the data. For that reason a definition of each activity follows:

Bibliography and Library Development

A bibliography was developed as an aid to legislators, their research staff, institutions of higher education, and to individual researchers interested in the area of inter-institutional television. Entries have been selected and compiled to represent printed resources currently available.

Inventory of Television Facilities and Utilization

To gain an assessment of the present level of educational television development within Minnesota, the staff developed and distributed a questionnaire concerning television facilities and plans at each of the institutions of higher education in Minnesota. Similar information was also sought from the four educational television stations serving Minnesota. An analysis of the inventory is included in the following chapter.

Visitations and Phone Interviews

In order to have the benefit of experience of other states, the staff attempted to assemble information from some of the most significant activities developing elsewhere in the country. Members of the staff visited states where significant educational television developments had been reported and held phone conferences with those in many parts of the country where television systems were under consideration or were starting operation. Information was also assembled from public documents of systems in other states. This data was gathered to take advantage of special information of other attempts to develop inter-institutional educational television. Again, resultant data is included in the next section of this Study.

It should be stressed that the State of Minnesota has had some significant and important television development under the leadership of the Twin City Area Educational Television Corporation. KTCA-TV was among the first educational television stations to become operational. The cooperative arrangements among Channels 2 and 17 in Minneapolis-St. Paul, Channel 8 in Duluth, Channel 10 at Appleton, and Channel 13 at Fargo make possible broad coverage of the State. The microwave interconnection developed by the broadcast stations in Minnesota is an outstanding development, and ongoing plans for inter-state microwave service and microwave interconnection into Canada add substantially to the educational television capacity of the broadcast television stations for the institutions which utilize those services.

Engineering Study

The legislation establishing the Television Feasibility Study called for an engineering study of the State to provide information basic to the orderly development of television capability among institutions of higher education.

A number of questions could be adequately resolved only by the work of an engineering consultant with the necessary competence. What kinds of equipment would be needed to carry out the educational goals of institutions? What performance standards should be established? What would be the comparative costs of developing educational television services using the different methods available? What other communications systems are required by institutions of higher education? These and other questions were submitted to Jansky & Bailey, Inc., of Washington, D. C., the engineers employed to carry out the engineering phase of the Feasibility Study. The firm has conducted numerous studies in other states and was highly recommended by individuals within Minnesota with previous experience in this area.

The engineering study involved the examination of plans and present capability throughout the State of Minnesota within higher education, followed by the development of engineering recommendations based on these findings. The Chief Engineer of Jansky & Bailey, Oscar Reed, accompanied by members of the Study staff visited more than twenty institutions of higher education and three broadcast television stations. Working with members of the staff, it was possible to define the types of communications services the institutions most often requested. This data when analyzed and placed in priority order became the educational specifications which to a large extent directed the development of the engineering specifications and recommendations. A summary of the complete engineering report can be found in General Appendices D and E.

Another important development relative to the engineering phase was the establishment of a committee of television coordinators. To facilitate the discussion of standards for television equipment and to secure other advice from institutions of higher education relative to television technology, the Statewide Advisory Committee asked the Study staff to establish a television coordinators committee composed of representatives of each institution of higher education.

This committee was of great help in providing assistance to the engineering firm and in reacting to the different engineering considerations involved in the Study. The coordinators have also assumed responsibility under the Minnesota Liaison and Facilities Commission for examining all applications for television equipment under Title VI, Part B, of the Higher Education Act of 1965, and have discharged those responsibilities twice since appointment. This committee might well continue to function on a permanent basis.

Action Projects

The legislation establishing the Study calls for experimental testing of the feasibility of inter-institutional cooperation in the use of televised instruction. Hence, an attempt was made to gain some insights into the kinds of problems that occur when inter-institutional educational television activity takes place. A number of projects were funded and the results observed. It was understood that no project would be funded which was not inter-institutional in its format. Resultant data might include the following: (1) attitudes of those planning the project at each institution; (2) attitudes of student subjects; (3) an identification of problems which developing during the project, as well as resulting solutions; (4) an assessment of faculty and student attitudes toward the inter-institutional television development. It was not possible to develop all such information for each of the projects but an attempt was made to gather as much of the evidence as the format of the particular project would allow.

An effort was made to fund as many different kinds of projects as possible. It was hoped that some projects would involve institutions of the same general nature, others would involve institutions of quite different types while others would test different kinds of inter-institutional educational television development and materials. Included was a project developed between the University of Minnesota and the Metropolitan Junior College to microwave a general reading course and an anthropology course from the University to the Junior College, a project in which a course developed at Mankato State College was used at Austin Junior College, a project in which special materials in connection with a course developed by a professor at St. Cloud State College, and offered on KTCA, was prepared and used at Mankato State College, one in which Rochester Junior College and Austin Junior College cooperated in the development of the course materials which have been used in the fall quarter of 1966 at both institutions, a project involving a connection between Bemidji State College and the computer of Renown Properties, Incorporated, in the Twin Cities, and a project in which television lectures for an experimental course in German were provided on KFME-TV in Fargo for a class at Concordia College in Moorhead. The Study staff made every effort to be experimental--that is, to avoid becoming an operational staff actually making decisions about how television instruction would be used among the participating institutions. The decisions made by those who were involved in the project became the decision to be implemented while the staff observed what happened as the institutions worked together. Thus, what occurred as part of any particular project did not represent a result planned by the staff but what the participating institutions wishes to have happen. The Study staff sought only to implement their wishes.

The staff was aware of the legislative intent that as much as possible of the $150,000 allocated for the study should be spent on the collection of data and its interpretation. For this reason, efforts were made wherever possible not to purchase equipment but to rent it for whatever period was necessary to complete a particular piece of research. Because of this, costs of providing equipment for projects sometimes ran higher than might be the case in the natural operational situation and this should be borne in mind in making cost evaluations.

It is of interest that the first projects suggested were stimulated primarily by administrators. Subsequent projects came as the result of faculty discussions regarding the merit of using television for instruction.

Commissioned Papers

It was apparent to the Statewide Advisory Committee and the Study staff that it would not be possible to consider certain significant questions upon which the Legislature would need advice and which were of concern to the institutions of higher education. After discussion it was decided that a series of commissioned papers should be arranged in order to give guidance in the drafting of the final report. Commissioned papers were contracted for in the following areas:

New Communications Technology and Its Relationship to Instruction, Dr. John P. Witherspoon, Associate Director Brooks Foundation, Riveriera Campus, University of California, Santa Barbara.

Faculty Rights, Responsibilities, and Concerns as They Relate To the Intra and Inter-Institutional Use of Television Materials, Dr. Charles McIntyre, Coordinator of Instructional Television, University of Illinois.

The Copyright Law and the Inter-Institutional Distribution of Instructional Materials by Television, Dr. Fred Siebert, Dean, College of Communication Arts, Michigan State University.

Federal Programs and Legislation for the Development of Television Systems, Dr. John Bystrom, Assistant to the Under-Secretary of Educational Television, Department of Health, Education and Welfare.

Existing Inter-Institutional Communication Networks, Dr. Glenn Starlin, Associate Dean, College of Liberal Arts, University of Oregon.

The Relationship Between Elementary and Secondary Education to a State Communications Network Serving Higher Education, Dr. Chester Babcock, Assistant Superintendent of Public Instruction, State Department of Instruction, Olympia, Washington.

The full text of the commissioned papers is included in General Appendix F, and a summary of the results is given in the following chapter. The papers proved to be an extremely useful source of information to the Study staff and numerous comments have been received about the advisability of having them published under a separate cover in order to ensure their wide usefulness within the State as well as elsewhere.

Management Discussions

The Statewide Advisory Committee requested that the staff consult the administrative heads of each of the public systems of education and request that the administrators and others examine the various educational management alternatives that should be considered in preparing recommendations for the final report. Should an existing state agency be assigned responsibility for statewide development of educational television for higher education? What is the appropriate role of faculty? What other considerations would be important in developing a management recommendation at the conclusion of the Study? These were some of the questions which the Statewide Advisory Committee knew it would have to consider and the committee wished to do so in the context of recommendations by the heads of systems of education.

The Study staff contacted the following: Chancellor Bevington Reed of the State College Board, Executive Director Philip Helland of the State Junior College Board, Minnesota State Commissioner of Education Duane Mattheis, President O. Meredith Wilson of the University of Minnesota, and Director Richard Hawk of the Liaison and Facilities Commission. These administrators appointed a subcommittee which worked on a report throughout the summer of 1966. Later they met to consider and approve the final draft. At that meeting Brother Josephus Gregory represented the private colleges. Later, a second meeting of the group was held.

The final educational management statement is included in General Appendix G. The document was approved by the Statewide Advisory Committee as a guide to the Study staff. The management recommendations included in the Study encompasses the principles set forth in the document.

The Context of the Study

Every study is done within a particular environment, and an understanding of that environment can be important to interpretation of the research.

In Minnesota, the Twin City Area Educational Television Corporation opposed the Study legislation, taking the position that the intent of the legislation was not clear and the amount suggested for the Study was excessive. Although the Board of the Twin City Area Educational Television Corporation later participated in the Study through membership on the Statewide Advisory Committee (where representatives of KTCA-TV made a substantial contribution to the Study), the management of KTCA-TV did not participate except by furnishing facilities for project activities, and some other material, as requested. The management took the view that it was important that their non-involvement should be protected so as to make later criticism of the Study possible.

This background problem created a number of difficult situations during the Study and it was only through the cooperation of the representatives of the KTCA-TV Board and members of the Study staff that these problems were minimized.

Another aspect of the environment which should be recognized is that inter-institutional cooperation among institutions of higher education is still in a developmental stage. Many of the procedures for such cooperation have yet to evolve, and some understandable reluctance to develop inter-institutional projects is clearly due to apprehension about the way in which cooperation can be managed so as to contribute to the program of each institution without jeopardizing the ability of the institution to provide the best educational program for the students for whom it is directly responsible. The Study staff recognized that the experience of cooperation among institutions necessary to the development of the Study would be lacking in some cases and that this would impose some limitations upon projects developed.

These special circumstances were not allowed to interfere with the research design or the collection or interpretation of data, but they did impose some limitations on the scope of the Study.

CHAPTER IV

RESULTANT DATA

The Study staff with the guidance of the Statewide Advisory Committee worked to gather as much pertinent information relative to inter-institutional television as was possible in the time available. Resulting data from these inquiries are presented in summary form in this chapter. In several instances, repetition occurs. However, in the interest of clarity, and to maintain continuity within each of the sections, it was not edited from the summaries.

Bibliography and Library Development

A bibliography of materials pertaining to educational television was developed to: (1) serve as a guide to the Study staff in the development of the report; (2) be available to the institutions of higher education which might be considering educational television development; (3) provide an additional source of information for members of the Legislature and their research staffs. The Study staff reviewed the substantial inventory of printed materials and research available in the areas of instructional television. It was found that many of the most valuable books and periodicals were no longer in print or are not readily available. This was true even with materials having relatively current publications dates (as recent as 1962 and 1963). Classifications are general in character, and entries have been placed under the headings most directly related to their content, and with few exceptions have not been duplicated. Secondary sources have been included in some instances for ease in locating the published materials or for the summation and review of more extensive studies. The final selected bibliography is included in General Appendix G and lists 490 entries.

The staff with the consent of the Advisory Committee developed as complete a library as possible of the materials listed in the bibliography. Currently this collection has a total of 465 bound volumes and periodicals. So these materials may be available to individual researchers and institutions, they will be deposited with the Liaison and Facilities Commission or one of the State college or University libraries at the conclusion of the Study.

Inventory of Television Facilities in Minnesota

To obtain an accurate report of educational television facilities and plans for future development in Minnesota, the staff distributed a questionnaire to each of the institutions of higher education within the State, and to each of the educational broadcast stations. Five of the colleges did not respond to the original survey or the follow-up. This initial data was later modified as the engineering visitations provided additional information.

Table 1 indicates the status of television developments and facilities at institutions of higher education. From this information a number of generalizations may be made.

1. Six institutions, including Concordia College, Moorhead, Mankato State College, the University of Minnesota, Moorhead State College and St. Cloud State College, teach courses, using educational television broadcast stations.

Table 1: PATTERN OF TELEVISION DEVELOPMENTS IN MINNESOTA INSTITUTIONS OF HIGHER EDUCATION

INSTITUTION	Courses by Broadcast TV	Courses by Closed-Circuit TV	Number of TV Students	Number of Rooms Equipped for Television	Number of TV Receivers	Capacity of Viewing Rooms	Image Orthicon Camera	Vidicon Camera	Film Chain	VTR Quadrature Record/Playback	VTR Quadrature Record Only	VTR Quadrature Playback Only	VTR Helical Scan Record/Playback	Mobile Unit
Augsburg College	-	-	50	2	2	50								
Austin Junior College	-	1	20											
Bemidji State College	-	-	-					2					2	
Bethel College	-	-	12	3	3	60								
Brainerd Junior College	-	-	-	1	1	100								
Carleton College	-	-	-	-	-	-								
Central Junior College	-	-	-	-	2	-								
College of St. Benedict	-	-	-	1	1	50								
College of St. Catherine	-	-	6	12	12	600								
College of St. Scholastica	-	-	-	3		150								
College of St. Thomas	-	-	1	1	4	225								
Concordia College (Moorhead)	3	-	1,400	3	5	600								
Concordia College (St. Paul)	-	-	-	-	1	80								
Eveleth Junior College	-	-	-	1	1	40								
Gustavus Adolphus College	1	-	-	2	2	40								
Hamline University	-	-	-	-	-	-								
Macalester College	-	1	675	25	37	966		1					1	
Mankato State College	2	2	3,277	10	30	740		3	1				1	
Moorhead State College	2	-	100	4	8	240								
Rochester Junior College	-	1	91	1										
St. Cloud State College	4	-	300	-	-	-								
Southwest State College														
University of Minnesota	5	89*	32,227	33	70	7,380	5	12	2	3	1	2	1	1
Winona State College	-	-		13				2					1	

* Courses use television for instruction at least once a week

2. Few Minnesota institutions of higher education have facilities for the production of televised material. There is a substantial installation on the Minneapolis Campus of the University of Minnesota which is used to provide instruction for more than 89 courses during the academic year. This involves more than 32,000 students. The television materials are distributed by a six channel closed-circuit system encompassing thirty-three classrooms. During the winter quarter 1966-67, a three channel system will also serve the St. Paul Campus. Television studio production equipment includes cameras, film chains and video tape recorders. Mankato State College has a similar but smaller system which is used in the teaching of two courses involving more than 3,000 students. Macalester College in St. Paul also uses a small closed-circuit system to teach a course with an enrollment of approximately 700 students. The facilities at these three institutions are the only ones equipped for the production of televised courses.

During the fall quarter of the 1966-67 academic year, Austin and Rochester Junior Colleges used portable video tape recorders for the closed-circuit playback of recordings made during the summer as part of the Feasibility Study.

3. All of the State Colleges either have or are in the process of developing capability to use small television cameras and video tape recorders for image magnification and other classroom purposes.

4. No State Junior College has facilities for production of distribution of televised materials within their campuses.

5. Carleton College and the University of Minnesota have mobile television units for production and recording from remote location.

The individual state colleges and outstate campuses of the University have been planning the development of production capability for course materials as well as to provide students enrolled in speech and teacher education curriculums direct experience with instructional television.

The University of Minnesota and IBM, Rochester, are cooperating in the use of a microwave transmission system as a means of providing televised instruction from the Minneapolis-St. Paul Campus to students in the Rochester area.

Standard AM broadcast facilities are in existence at the University of Minnesota and St. Olaf College. An FM broadcast station serving St. Cloud and the Twin Cities Area is being completed by St. John's University. Mankato State College and the University of Minnesota, Duluth, currently operate low-power FM broadcast stations. A radio committee has been established by the private colleges to discuss a statewide radio development and a number of public institutions of higher education have exhibited similar interest.

As shown in Table 2, the educational broadcasters serving Minnesota have production facilities at KTCA-TV and KTCI-TV in Minneapolis-St. Paul, WDSE-TV in Duluth, and KFME-TV in Fargo, North Dakota. The fifth station, KWCM-TV in Appleton, has plans to develop production studios. These facilities are utilized by higher education for the broadcast of televised materials. During the fall quarter of this academic year the University of Minnesota used KTCA-TV for programming

Table 2

PROGRAMMING AND FACILITIES AT MINNESOTA EDUCATIONAL TELEVISION STATIONS

	KTCA Ch. 2 Mpls.-St. Paul	KTCI Ch. 17 Mpls.-St. Paul	KWCM Ch. 10 Appleton	WDSE Ch. 8 Duluth	KFME Ch. 13 Fargo
Length of Operation	9¼ yr.	1 2/3 yr.	11 mo.	2½ yr.	3 yr.
Radius of Signal Area	Class B 61 mi. 100 UVM 81 mi.	26 mi.	55 mi.	85 mi.	50 mi.
Number of Students in Area					
Elementary	448,000	400,000	50,000	100,000*	44,000*
Secondary	205,000	190,000	35,500		
College	64,000	43,000	1,500	10,000	10,500
Total	717,000	633,000	87,000	110,000	54,500
Number of Students Receiving TV Instruction					
In School Elementary	300,000	0	20,000		25,000
In School Secondary	60,000	400	5,000		900
In School College	2,000	600	500		750
In School Total	362,000	1,000	25,500		26,650
Out of School Elementary	10,000	600	40,000		
Out of School Secondary		1,200	25,000		
Out of School College		800	1,500		
Out of School Total		2,600	66,500		
Hours per Week Programming					
Elementary	30	0	25	35	11
Secondary	10	5	8	25	1
College	12	6	12	15	3
Total	52	11	45	75	15
Tower Height	620 ft.	490 ft.	499 ft.	805 ft.	490 ft.
Transmitter, Effective Radiated Power	100 kw	47.9 kw	366 kw	316 kw	265 kw
Microwave Interconnect for Program source	Yes	Yes	Yes	Yes	Yes
College Courses 1965-66	13**		1	5	9
Production Equipment					
Image Orthicon Camera	6**			3	
Vidicon Camera	1**			2	2
Film Chain	4**			2	2
VTR Record/Playback	4**			3	2

*Figures for Elementary and Secondary Combined
**Figures for KTCA and KTCI-TV Combined

in the amount of 7.5 hours per week with some of these programs also broadcast by KWCM-TV and WDSE-TV.

St. Cloud State College continues an eight-year program of production of one course each quarter over KTCA-TV. The college also produces courses at the commercial station in Alexandria, KCMT-TV.

Mankato State College offers two courses through the broadcast facilities of KETC-TV, the commercial station serving Mankato and Southern Minnesota. Moorhead State College produces courses at the broadcast facilities of KFME-TV, Fargo. Bemidji State College programs materials of a cultural and community service nature at a sub-studio of Alexandria in Hackensack.

Concordia College, Moorhead, offers three English courses by broadcast television through KFME-TV. Currently the College is also participating in an experimental German course with the University of Minnesota as part of the Feasibility Study. Other private colleges offer a variety of community and cultural programs in the Minneapolis-St. Paul area and throughout the Minnesota Educational Television Network.

The five educational television stations serving Minnesota provide signals which can be received by more than 1,201,500 students, 86,000 of which are enrolled in college level programs. This represents 88.6 per cent of the Minnesota college population. Currently more than 7.1 per cent of students in the signal area are receiving a part of their instruction through the broadcast television stations. Within the year 28 courses were offered for college level credit by the five stations.

It should be noted that the apparent difference in courses taught on broadcast television by the institutions and the educational stations may well be due to differences in the period of reporting.

The educational broadcasters have joined together to form the Minnesota Educational Television Network, and are interconnected by a microwave system from the Twin Cities to Appleton to Fargo, and another from the Twin Cities to Duluth. KTCA-TV is in the process of adding full color capability, the production of which will be available to all stations served by the network. They also plan a regional microwave interconnection with 12 additional stations in a six-state area. An additional microwave interconnection is being constructed from Duluth to Port Arthur. At Duluth, a project is pending with the U. S. Office of Education to add full color transmission capability and to increase production capacity.

The broadcast coverage of the State may be increased as a result of a study now being completed under a grant from Title III, Public Law 89-10, the Elementary and Secondary School Act.

Assessment of Television Developments in Other States

Study staff, with the approval of the Statewide Advisory Committee undertook an assessment of television developments in other states. Visits were made to states with significant television developments. Phone conversations were made to individuals in positions of responsibility in other states. The following data was assembled.

An initial review of the literature and consultation with the National Association of Educational Broadcasters disclosed three developments in other states which used inter-institutional television for higher education. These included an eight-year experimental program in Oregon, an Educational Microwave Network in Texas, and a program in Florida oriented to provide instructional television services to county junior colleges. To better evaluate the operation and usefulness of these inter-institutional systems, members of the staff arranged to make on-site visitations.

Oregon State System for Higher Education

The Chancellor of Higher Education in Oregon, working with an inter-institutional committee, secured a grant of $200,000 from the Fund for the Advancement of Education which was matched by the State System of Higher Education. Subsequent grants from the Fund and the Ford Foundation, as part of a teacher released-time program, contributed to the maintanence of an experimental State television system for a seven-year period.

Initial plans called for closed-circuit or a microwave interconnect among the campuses of the major institutions. However, after securing preliminary estimates from the Oregon telephone utility, staff determined that broadcast facilities could be built and maintained for a two-year period for an amount almost equal to the leasing of the closed-circuit system. A broadcast transmitter and production studio were constructed at Corvallis and interconnected with microwave production facilities at Eugene. A second transmitter was constructed at Portland providing potential coverage of approximately seventy per cent of the

State's college and university campuses. Participating instututions during the first phase of the project were Oregon College of Education at Monmouth, Oregon State University at Corvallis and the University of Oregon at Eugene. Willamette University, a private institution at Salem also cooperated during the first year but withdrew from participation after the 1958-59 academic year. Portland State College entered as a participant after the educational television station in Portland became operational in 1961.

The establishment of the Oregon System of Higher Education in 1932, was the result of the implementation of a study by the U. S. Office of Education. This action provided a hedge against increasing duplication of programs at major state institutions and reorganized Oregon higher education. As a result, the presidents of the institutions now report to a Chancellor of Higher Education who in turn is responsible to a public board of education. The television project was established under the direction of a coordinator who was responsible for working with represenatives of the various institutions in selection of course offerings and supervision of the production and organizational aspects of the program.

Construction of facilities and necessary organizational work was sufficiently advanced to permit inter-institutional television instruction to start at the beginning of the 1957-58 academic year. With the aid of the previously mentioned grant and a high level of administrative support from the Chancellor of Higher Education, the epxerimental program continued for the next seven years. During this period many courses were developed and offered both on individual campuses and among the various institutions. A variety of patterns of instruction was used. In some instances the television teacher was solely responsible for all instruction and examination. In other cases the television teacher presented lessons once or twice a week supplemented by live discussion handled on each campus by regular faculty or graduate assistants. In one case, a team of professors conducted a television session for part of the class hour followed immediately by a discussion and question period under the direction of on-campus discussion leaders. Guest lecturers were used extensively in some of the courses. Another method utilized the employment of a full-time instructor to assist the television instructor in preparing classroom materials and in handling discussion sections and examinations at the participating campuses.

Televised courses included highly specialized offerings to students on campuses where comparable instruction was not regularly offered. These courses provided an enriched curriculum but were generally low in enrollment and relatively costly in terms of the number of students reached. In instances where courses are not normally provided on a campus, savings are difficult to compute as the cost of providing a comparable course using conventional classroom lecture-demonstration sessions would have been the only other likely alternative. In situations of this kind, the cost of using television to distribute a course is usually less than providing instructors in very specialized but low enrollment courses.

At one time as many as five courses were offered simultaneously during the same academic quarter. The instructional patterns attempted included the development of a course with meeting of the faculties of the various institutions to determine significant content and the emphasis that should be given each of the instructional units. A master instructor was selected from UCLA and hired for one quarter to teach the video recorded course. Tapes of this course have been used over the past two years but will be discontinued at the end of the 1965-66 academic year as only one institution seems to have continued an interest in using them. The Director noted that while this course had a high level of inter-institutional faculty interest and support, good financial backing, and administrative support, it has fallen into disuse. Reasons for this disinterest on the part of institutions varied. In one case an institution revised its psychology sequence and no longer found the course applicable. In another instance, faculty at an institution decided they preferred to teach the course locally. As course sequences and curriculum were revised, televised courses tended to be used by fewer of the participating institutions.

The first Director of the project noted that much of his time was devoted to bringing about discussion and negotiation with the members of the various institutions so that agreement could be reached on course offerings. As might be expected, this need to maintain coordination and continued communication among the several institutions tended to be one of the more difficult problems of the experiment.

In 1963, a new Chancellor of Higher Education determined that, if the television system was of genuine merit, it should be at a point in its development where inter-institutional financing and programming should be sufficient to sustain it and artificial promotion and development should no longer be necessary. Without the benefit of special financing and the friendly persuasion of the project Director, institutions have not continued their use of the inter-institutional television. The current Director noted that the system developed to serve higher education is now used almost exclusively for elementary and secondary programming. Currently only one course is offered for inter-institutional use, the others being discontinued for lack of demand.

It would seem that the seven-year experiment in inter-institutional televised instruction demonstrated that the distribution of common college courses to several campuses by open-circuit television broadcast is technically and administratively feasible. It has also shown that inter-institutional television compares favorably with conventional classroom instruction. (The criterion for evaluation was the relative achievement of students as measured by examination).

Faculties were generally favorably disposed to the development of televised instruction but tended to become less supportive if specific courses in their subject matter specialties were considered as possible television courses. For the most part, faculty members seemed to favor development of television for use on his own campus rather than inter-institutional television for broadcast to several campuses. The project Director attached significance to the high level of acceptance given television instruction by those with previous experience as users of television instruction or as television teachers.

The Director noted that the combination of inter-institutional cooperation and television instruction proved to be too much of an innovation for ready acceptance. He believed that when faculty have convenient access to facilities and experience in the use of the medium in solving certain of their instructional problems one can look for expansion and acceptance of television. At the time the network was being developed the concept of a total course taught on television seemed to be a feasible inter-institutional activity. Now, with experience, it seems more likely that parts of courses and special lesson materials, with emphasis upon the contribution by each institution of its special strengths and resources, have greater potential for inter-institutional use.

As an outgrowth of the television project in Oregon closed-circuit production centers were established at Portland State College and the Oregon College of Education. These are in addition to the broadcasting facilities at Portland and Corvallis which are supported by studios at Eugene, Corvallis and Portland. Faculties are using intra-campus systems to teach certain laboratory procedures and to present parts of courses. They have also asked that films be played back and repeated several times during the day so that students can view them in their dormitories, fraternity houses, and classrooms. These materials were previously shown in classes and are now being used as out-of-class assignments or resources. The present plans for utilization of television on a closed-circuit intra-institutional basis suggests that there is currently more interest in expanding closed-circuit television for instruction on a single campus than for expansion of inter-institutional applications.

However, there are plans to continue limited uses of inter-institutional television during the next year in the production of parts of courses, special lessons and demonstrations. With the extra time available through the withdrawal of former courses, it will be possible to provide duplication or re-broadcast of many of these special programs. The Chancellor of Higher Education believes that the subtle changes in inter-institutional programming and the experience gained through closed-circuit television will result in a recycling of interest in inter-institutional television.

Texas Educational Microwave Project

The Texas Educational Microwave Project (TEMP) was brought into being in 1961 with financial assistance from the U. S. Office of Education and the Ford Foundation. Eleven public and private institutions in North Central Texas were joined together by a microwave system which provided closed-circuit interconnection. TEMP operations were centered in the Television Division of the University of Texas, which, in addition to providing facilities for course production, has the capability of distributing television signals simultaneously through broadcast microwave and intra-campus closed-circuit systems. The Division programs closed-circuit instructional materials for local use, playbacks video tapes for the TEMP system, and aids in the planning of future network operation.

From previous written reports, it has been determined that the network was administration oriented and had received considerable direction from the University of Texas. Early in discussions with the current Director, it became clear to the staff that the preliminary reports did not deal adequately with the current situation. While on the surface it had appeared that the high level of direction from the University of Texas and the extent of involvement of administrators to the partial exclusion of the teachers had been accepted, actually this was not the case.

During the first years of TEMP's operation, major decisions regarding inter-institutional policy were made by a committee composed of administrative representatives from the participating colleges and universities. Faculty members were involved after major curricular decisions were made by the committee. From the Fall of 1961 through the Spring of 1964, student enrollment dropped from 3,800 to 1,389 and that at the time of the staff visitation only one of the courses distributed on the network was to be used by more than one institution. Courses originally developed for TEMP distribution have continued but are now used by fewer institutions. Included are courses in American History, Chemistry, Psychology, Visual Arts, Music Appreciation, and a course in Science for elementary teachers from the Great Plains Library. A supplementary non-credit German course was also offered.

The administrative orientation and direction of the University of Texas was apparent from the outset and came to be viewed as a limitation to the effective operation of the system from the point of view of other participants. Member institutions saw a need for greater institutional participation and faculty involvement. Budget limitations prevented revision of current materials and the production of new courses. Yet in spite of some of these early difficulties many of the participating institutions believe that the problem could be overcome if basic changes in the administrative organizational structure of the project were made.

Continued faith and interest in inter-institutional television resulted in participation by seven of the original institutions who developed a plan for reorganization of TEMP. The Director, in consultation with the Presidents of the participating institutions, indicated that he did not intend to preside over the demise of the system, rather he made recommendations which would provide for a reliable and continuing operation. The suggestions for reorganization provided for greater participation by member institutions, greater faculty involvement, and a 50 per cent increase in institutional financial commitments. A newsletter published at the time explained the changes in the following manner:

> "The beginning of a new philosophy for TEMP operations has centered around maximum involvement of faculty in making decisions concerning the production, utilization, and evaluation of instructional television.
>
> The key to effective utilization of TEMP is the involvement of the classroom teacher, the academic administration, and the general administration of the member institutions in their accustomed areas of activity. With this in mind TEMP is now functioning on three levels: the TEMP Board is made up of representatives from general administration; the Program Planning Council is made up of academic administrators; and the curriculum committees are composed of teachers. The member institutions have provided more funds for program planning. It is up to the academic administrators and classroom teachers to decide how these funds can best be utilized to strengthen the TEMP offerings."

Two of the institutions were unable to manage the higher level of funding required and made the decision to withdraw from the system. Later a small private college joined TEMP. The organization has a current total membership of eight institutions.

One-half of the total budget has now been allocated to the Program Planning Council for use in the development of new and revised materials.

Recent experience has shown, however, that the added financial base is still not sufficient to provide for an adequate operation. More personnel are needed to aid staff and coordinate procedures. Diversification of staff is required to provide adequately for the development of newer materials and evaluation of existing materials. The revised funding will make possible rental of additional material and revision of existing course materials.

While responsibility for management is now shared more broadly the University of Texas continues to feel special interest and thus makes a heavy commitment to the network. The current budget is $60,000 yearly including a University of Texas contribution of $18, 400. The University also provides a television coordinator and the services of production personnel and facilities. Two or three new courses are currently planned and an upward trend in enrollment and participation is anticipated in the coming months. These changes in the TEMP operation have contributed to a new project vitality. The Texas experience indicates that an initially strong central control cannot by itself sustain a successful and ongoing operation. Failure to provide for faculty involvement and to support academic needs hinder the program.

Subsequent to the site visitation, TEMP has received a matching grant from the U. S. Office of Education in cooperation with the Coordination Board, Texas College, and the University System for a study of educational communication systems. This inter-institutional study will incorporate investigation of computer data, library retrieval, and audio communication possibilities available through the TEMP Microwave Network.

Florida Educational Television Commission

The 1957 Florida Legislature established an Educational Television Commission with the principal goal of developing television for upgrading junior college instruction. Junior colleges in Florida are established on a county basis. As a result, some are supported by a relatively small population and tax base. The junior colleges receive instructional television services without charge because of the special legislative support given to development of television stations.

The Florida Television Commission has responsibility for the development of transmission and production facilities, but as a rule does not become involved in the programming and scheduling aspects. It appears that the Commission, with representation from the junior colleges, public schools, commercial broadcasters and general public, is primarily a funding agency chiefly concerned with assisting the development of broadcast stations. After a station reaches operational status, the Commission continues to review station budgets, equipment purchases, and established equipment standards. In return for funding, the Commission has an informal agreement with each of the stations that they will serve the instructional television requirements of junior colleges without charge to the institutions.

The nine educational television broadcast stations in Florida, operate without electronic interconnection and have a fairly informal relationship with the Educational Television Commission. Ownership of the stations varies, with some held by community non-profit corporations, public school systems and institutions of higher education.

The stations work with the junior colleges in the planning and development of lower division courses. There is a belief that University and junior college courses should be as equivalent as possible and that this can be brought about through the televising of university level courses to the junior colleges.

Once every three months the station and production managers of each of the State ETV stations meet to discuss new programming schedules and the statewide video tape circuits. It is intended that the station managers serve as liaison between the junior colleges and the State Television Network. Institutional needs are defined by the station managers and used as a basis for developing a correlated state program schedule. The Director of the University of Florida station believes that it is difficult for a broadcaster to develop the necessary rapport with the individual institutions and that a separate professional staff should be available to work with the junior colleges in developing their television needs. He emphasizes that a staff of this type should not represent any special group.

Video tape recordings of course materials are moved between broadcast stations by Parcel Post of United Parcel Service. Local transmission of tapes is flexible and adjusted to the extent possible to accommodate college schedules. Repeat and multiple playbacks are programmed if requested by institutions. This willingness to accommodate local junior college needs has helped in gaining acceptance of television.

Administration and faculty at the older established junior colleges resisted to some extent being cast in the apparent role of poor relations, although the new, emerging schools have shown a much greater willingness to use television as it has offered a means of providing competencies they could not immediately develop. It was stated that the Dade County Junior College would have been unable to offer a full instructional program without television. As the new institutions gain experience and enrollments they tend to reduce their use of television and develop their own staff compentencies.

Many of the television courses available to the junior colleges are produced for university level students, and are not developed for exclusive junior college use. Junior colleges have access to the production facility for independent development of television material.

The Director at the University emphasized that careful and sensitive productions are essential for broad acceptance of a course. Approximately one full year is allowed for the television instructor to plan and produce from twenty-five to forty-five thirty-minute television lessons. Additional released time is made available the following year for evaluation and revision. After allowing the first year for evalaluations, revisions account for approximately one-third of the program material in a given course. In succeeding years revision occurs less frequently. Courses are usually reviewed by the junior colleges after the third year and if still current and satisfactory may be continued for a fourth or fifth year.

Television courses are distributed by closed-circuit within the University of Florida and on broadcast facilities at Gainesville and elsewhere in the State. The University usually transmits between two and five courses to the junior colleges each semester. Most of the thirty junior colleges in Florida use some television for instruction. The University faculty will supply examinations and other materials to the junior colleges on request. In courses where television is used, it is responsible for a part of the instruction but does not represent the entire teaching task. None of the eight courses produced at the University of Florida are instructionally self-sustaining as they all require some level of activity by the junior college instructor. While the television materials now available are all sequential or total course-oriented, the Director believes that there should be more special types of programming emphasizing several lectures or demonstrations.

Inter-institutional television in Florida does not include electronic interconnection among the various broadcast facilities and serves a relatively narrow segment of higher education. The junior colleges, established on a county basis, in some instances without broad instructional offerings, find that television instruction provided without charge to their budgets is a useful way of expanding the curriculum. The apparent willingness of the stations to repeat the programming in order to accommodate the junior college schedules has also been an important factor in bringing about acceptance. The Director of the University of Florida facility believes that the informal features which typify the relationship and organizations of the Florida system must be present in any inter-institutional system to ensure success.

Other Related Television Developments

Through visits and phone conferences, the Study staff secured the counsel of management and operational personnel from the television systems of other states. Though these operations were not currently contributing to inter-institutional instruction, many had facilities which would permit support and development of inter-institutional programming on a state or regional basis. A number of significant developments should be noted.

Chicago Television College

The Chicago Television College is in it's tenth year of operation and utilizes the facilities of WTTW-TV, the community educational television station. Since beginning operations in 1956, the TV College has had over eighty thousand individuals registered for college-level instruction. More than sixty different college credit courses have been offered in addition to three non-credit courses. Typically the TV College student is a woman in her early thirties, married and rearing a family.

A continuing program of research suggested early in the program that teen-age students viewing the television lessons in class at a junior college did not match the performance of either home viewers or other students taking the course under conventional non-television classroom conditions. Further investigation showed that the lower performance of the teen-age students could be improved with the addition of one or two extra hours of conventional class instruction per week as a supplement to the television lessons. Recent studies have shown that students who receive both televised and direct instruction perform as well, or a half grade better in their televised courses than in their regular on-campus classes.

The Television College is part of the Chicago Junior College system. Other campuses utilize some of the television instruction for in-class instruction, but there has been no inter-institutional use of the courses. Recently, however, video recordings of thirty-one courses produced by the Chicago system were released for distribution through the Great Plains Instructional Library. Other institutions may now use the Chicago courses through video tape recordings and payment of service charges.

South Carolina Educational Television Network

The South Carolina Educational Television Network began operation in 1958 as a closed-circuit statewide system. It was funded by the Legislature as a means of upgrading secondary education, and is accepted in the State as a viable and important educational resource. The closed-circuit distribution system consisting of a combination of microwave and cable is rented from a consortium of South Carolina telephone companies at a cost of one million dollars per year. This figure is approximately one-half of the annual operation budget. As television service expanded to include the programming for industrial retraining and instruction of state and municipal employees, programming to the elementary schools, and programming for cultural and public service. A network of television broadcast transmitters was established to supplement the closed-circuit system. Three channels are currently operational and the Educational Television Commission hopes to complete the statewide open-circuit during fiscal 1966-67.

Televised instructional programming to the public schools and units of state and local government is provided without charge. Programming requested by industry and professional organizations for upgrading and retraining of personnel is financed by a revolving fund through a private foundation that works cooperatively with the State network. The foundation produces materials locally and utilizes courses developed elsewhere whenever appropriate. Several of the video tape courses developed by KTCA-TV, Minneapolis-St. Paul, have been used by the South Carolina network.

Higher education has seldom used the system. Utilization has been limited to the production of some inservice teacher training materials and one college-level course for credit.

Management of the state television network is provided by the State Educational Television Commissions appointed by the Governor which is composed of one member from each congressional district.

Washington County,Maryland Closed-Circuit Television

In the early fifties, Hagerstown (Washington County, Maryland) was a center for television development. Joint funding was provided by the Electronic Industries Association and the Fund for the Advancement of Education of the Ford Foundation. A six-channel closed-circuit distribution system interconnected a production studio in Hagerstown with virtually all the elementary and secondary schools in the state. As foundation and other support monies were withdrawn, Washington County assumed full responsibility for maintaining the project. Programming is directed toward both the elementary and secondary schools. While the system does not serve institutions of higher education, it is an example of a television development that gained a high level of acceptance by faculty, students and the community. School authorities estimate that without television the county would require more than one hundred additional teachers and a budget increase of almost one million dollars to duplicate courses that have been added to the instructional program. This amount is more than three times the annual operating cost of the television network. Presently, the system consists of 125 miles of cable, operating on six channels. The school district pays Chesapeake and Potomac Telephone Company $140,000 annually for this service. The Hagerstown production facility will soon be interconnected with a developing state-supported broadcast television network.

The majority of programming is directed toward the public schools and is concerned with types of instruction that television can present best. This allows the classroom teacher more time for individual work and attention to student needs.

California Educational Television

The State of California recently completed a plan calling for the development of a network of transmitters and translators to provide broadcast service to the entire State. Since a communications satellite is considered to be technically possible, the feasibility of interconnecting these transmitters by ground microwave or direct transmission is being investigated. A basic broadcast network would be supplemented by local closed-circuit or 2500 megacycle distribution systems serving elementary and secondary school districts and institutions of higher education.

The California plan identifies only the minimum facilities necessary to provide a statewide broadcast service. A single channel microwave network has been recommended for interconnection of the broadcast stations. The plan recognized that since programs not requiring immediate attention are most economically distributed by physical transportation of the video tapes, construction of the microwave link should be on a step-by-step basis. Initial construction would be limited to that which is necessary to tie the TV broadcast stations together. California educational television stations differ considerably in their orientation; some are primarily community stations, and others serve inschool instructional audiences almost exclusively.

Many of the educational institutions in California have developed television programming facilities for local orientation of instructional materials. Several branches of the University of California, nine of the eighteen state colleges, and some of the junior colleges are equipped to produce television programs. Most of these facilities are intended for closed-circuit intra-institutional use rather than for broadcast to the elementary and secondary schools or the general public.

Recent Television Developments

Other states which recently completed plans for development of statewide television facilities include New York, with a statewide network, production centers at each of the major state institutions of higher education, and five broadcast television transmitters. A somewhat similar development is now underway in Kentucky, and a state broadcast and educational communications network is planned by Iowa including a major production facility at Des Moines and other supporting production centers at the state college and the universities. In all, twenty-six states are currently studying or implementing plans for the development of statewide television systems.

A demonstration program conducted during the 1965-66 academic year by the Council of Higher Education Institutions in New York City was intended to test the feasibility of the cooperative use of instructional television by twenty-six public and private institutions in the New York metropolitan area. Despite diversity of institutional objectives, limited television facilities owned by member institutions as well as reluctance on the part of administrators to make major commitments in this area, the educational potential of television was recognized and demonstrated. Presently, plans for future development are unknown. However, recommendations growing out of the demonstration project call for a permanent staff, long-range financing, joint production of special television materials, inservice training for New York City teachers, and offcampus credit for broadcast courses.

Management Developments in Other States

Of the fifty states, only Kansas, Louisiana, Minnesota, Montana and New Jersey are without some type of educational television authority designated by the governor or the legislature of the state. Table 3 indicates states listed by the U. S. Office of Education as having a designated television authority as well as those with interconnection of either broadcast television stations or closed-circuit systems.

Discrepancies in respect to the actual number of states with designated administrative agencies or commissions were noted in the reference materials. This appears to be a problem in identifying the precise role and scope of the agency. Some states have provision for educational television under the board of education, while others assign the responsibility to television commissions or to some other governmental agency.

The following assumptions may be made with respect to current status of television developments in other states: (1) the use of inter-institutional television by higher education has been hampered by some problems of faculty and student indifference, lack of coordination of curriculums and class schedules, lack of other types of cooperative instructional relationships between institutions, inadequate financing for new courses and television lessons and a general reluctance on the part of institutions and faculties to work inter-institutionally. It appears that when institutions have not had previous background experience with inter-institutional instruction, a course offered in total by television is not a satisfactory basis for initial development of inter-institutional instructional activities. There is a continuing interest on the part of faculty and administration to use television as a basis for sharing scarce instructional resources. Attempts to increase flexibility in scheduling and production and to provide means of involving greater faculty participation in planning are bringing about a renewed interest in some of the existing systems; (2) the existence of a state television network with its related hardware is not sufficient to bring about significant levels of inter-institutional television instruction; (3) the method of signal transmission or distribution, e.g. broadcast closed-circuit 2500 megacycle, seems to have little bearing on the use and acceptance of television institutions of higher education; (4) a number of states are currently planning television networks which combine broadcast and closed-circuit distribution with supplementary production centers.

Table 3: STATUS OF STATE TELEVISION SYSTEMS, DECEMBER 1966

State	Designated Television Authorities	Interconnected Stations or CCTV Systems	Remarks
Alabama	yes	yes	State owned interconnect programmed by 3 sources: 2 universities and 1 community ETV organization
Alaska	yes	no	
Arizona	yes	no	
Arkansas	yes	no	
California	yes	yes	Private cooperative interconnect of 3 stations
Colorado	yes	no	
Connecticut	yes	yes	State interconnect (in process), community stations supported by state funds
Delaware	yes	yes	State CCTV system
Florida	yes	no	Number of partially state supported stations, not interconnected, but share video tapes
Georgia	yes	yes	State owned interconnect
Hawaii	yes	yes	State owned interconnect
Idaho	yes	no	
Illinois	yes	no	
Indiana	yes	no	
Iowa	yes	no	
Kansas	no	no	
Kentucky	yes	yes	State owned interconnect (in process)

Table 3 Continued

State	Designated Television Authorities	Interconnected Stations or CCTV Systems	Remarks
Louisiana	no	no	
Maine	yes	yes	State owned interconnect, under contract to the University of Maine
Maryland	yes	yes	State owned interconnect (in process)
Massachusetts	yes	no	
Michigan	yes	no	
Minnesota	no	yes	Private interconnect of community stations
Mississippi	yes	yes	State owned interconnect (in process)
Missouri	yes	no	
Montana	no	no	
Nebraska	yes	yes	State owned interconnect between University and Stated owned stations
Nevada	yes	yes	State owned interconnect (in process)
New Hampshire	yes	yes	State owned interconnect (in process), operated by University of New Hampshire
New Jersey	no	no	
New Mexico	yes	no	
New York	yes	yes	State supported interconnect of community owned stations (in process)
North Carolina	yes	yes	State owned interconnect, operated by University of North Carolina
North Dakota	yes	no	
Ohio	yes	no	

Table 3 Continued

State	Designated Television Authorities	Interconnected Stations or CCTV Systems	Remarks
Oklahoma	yes	yes	Interconnect between 1 state and 1 school owned station
Oregon	yes	yes	State owned interconnect, operated by state system of higher education
Pennsylvania	yes	no	
Rhode Island	yes	no	One state owned station
South Carolina	yes	no	Statewide CCTV and broadcast network
South Dakota	yes	yes	State owned interconnect (in precess), operated by institions of higher education
Tennessee	yes	no	One state owned station (in process)
Texas	yes	no	
Utah	yes	no	
Vermont	yes	yes	State owned interconnect (in process), operated by University of Vermont
Virginia	yes	no	
Washington	yes	no	Private network: Community stations in Seattle and Yakima rent microwave interconnect
West Virginia	yes		
Wisconsin	yes		
Wyoming	yes		
Puerto Rico	yes	yes	State owned interconnect

Engineering Study

The Statewide Advisory Committee early in the Study authorized Jansky & Bailey, Broadcast Television Department of the Atlantic Research Corporation, to prepare an engineering feasibility report concerning the application of educational communication techniques to the needs and interests of Minnesota higher education. The complete Engineering Study Report is included in General Appendices D and E. The all-encompassing term "educational communication" includes the following systems:

Telegraphy - The long distance transmission of information in a printed or coded form.

Telephone - The transmission of speech or sounds.

Television - The transmission of live film or picture images and related sound in various forms between one place and another.

The task of the engineering firm was to assist the Feasibility Study and Minnesota colleges and universities in relating their educational needs to the development of a flexible electronic communications system. Adapting the technical possibilities to education requires a careful definition of use, evaluation of available transmission methods and design of an appropriate system. Other factors which should be considered include time available for development of the system, capability of present day equipment, existing needs and requirements, budget limitations, possible multiple use of facilities and anticipated developments in technology. A vigorous competition among television equipment manufacturers results in the continual improvement in the equipment available for educational applications.

The descriptions listed in General Appendix E of the document are accurate at this time. One may be certain, however, that the technology will continue to advance. New items will be developed and improved. Therefore, if equipment is to be purchased at some time in the future, the specifications should be updated and supplemented by an unbiased source. The specifications will serve as a guide to vendors and, if followed, will ensure that equipment supplied by them will meet the standards required for educational television.

Available Educational Communications Systems

To establish a base for futher study preliminary conferences were held with institutions of higher education, national educational television organizations, and with the engineering firm. These conferences, accompanied by a review of pertinent literature led the Staff to believe that Minnesota colleges and universities are interested in a variety of types of cooperative arrangements with other institutions. It was also recognized that an electronic interconnection which would accommodate transmission of a television signal could transmit a variety of other kinds of electronic information simultaneously with television, or at other times when television was not required.

By transmitting electronic signals through either copper cable or by air, various types of educational information can be exchanged by institutions of higher education. The types of signals which can be accommodated include the following:

1. Television - The transmission of live, film or picture images in various forms between one place and another.
2. Voice - The transmission of voice signals as in the case of a telephone conversation.

3. Teletype - The linking together of two typewriters by electronic connection so that messages typed on one machine can automatically be typed out on a second machine at a distant location.

4. Facsimile - The electronic transmission of photos, maps, or similar materials from one place to another. (This system permits the reproduction of facsimile or hard copy at remote locations.)

5. Data - An exchange of information by computer through the use of electronic signals. (This system permits the use of high capacity computers for instructional and research purposes, transmission of information relative to library reference material, administrative records and budgets, student records and a variety of other similar applications.)

Use of the preceding services could result in the delivery of a wide range of educational materials in visual, oral or written form, directly to the student. Information from many libraries, in various forms, could also be made readily available to students if an inter-institutional connection was provided. Inter-library loans would be expedited, thereby making these scarce resources available to a far greater number of students. Computer data exchange for instructional and research uses would be possible. Administrative record keeping would be facilitated and made more efficient.

Transmission and Distribution Systems

Educational Television Broadcast Stations

Educational television broadcast stations represent the open-circuit means by which television signals can be made available to every home and school within the range of the station. With such an open system, nearly everyone may gain some direct benefit from the operation of the station. A television broadcast channel can accommodate one program at a time. Minnesota has four such channels devoted to educational broadcasting, currently operating. These include KTCA-TV, Channel 2, Minneapolis-St. Paul; KTCI-TV, Channel 17, Minneapolis-St. Paul; WDSE-TV, Channel 8, Duluth; and KWCM-TV, Channel 10, Appleton. KFME-TV, Channel 13, located in Fargo, North Dakota, serves a major share of Northwestern Minnesota. Other channels reserved by the Federal Communications Commission for educational use in Minnesota include:

Alexandria	24
Austin*	15
Bemidji*	9
Brainerd*	22
Crookston*	33
Ely*	17
Fairmont	16
Hibbing*	18
International Falls	35
Mankato*	26
Marshall*	30
St. Cloud*	25
Wadena	20
Willmar*	14
Winona*	14
Worthington*	20

Television broadcast stations are assigned to operate on VHF channels (2-13) and UHF channels (14-83).

* Location of institution of higher education.

Closed-Circuit Transmission

Closed-circuit transmission provides a means whereby television materials can be distributed over cables to specific groups with receivers directly connected to the wired system. Only television receivers connected to the closed-circuit cable can receive the television information. If the cable is extended throughout a building or campus, every television set connected to it would be able to receive the television channels that are placed on the cable.

The University of Minnesota Campuses at Minneapolis-St. Paul, Duluth and Morris, in addition to the Campuses of Mankato State College, Winona State College and Macalester College currently have closed-circuit systems for distribution of instructional materials within each of the campuses. When such a cable is extended throughout an entire community as is done in many cities and towns in Minnesota, the system is referred to as "community antenna television".

Microwave Transmission

Both microwave transmission and closed-circuit transmission confine a television signal to a selectively closed channel. The frequencies used for microwave are extremely high and resemble light in their capability to be focused into a narrow beam. They cannot be received by conventional home television receivers. Microwave transmission differs from closed-circuit in that a cable system is not required. The signal is, instead, beamed from point to point through the air. Only special microwave receivers in direct line of sight of the microwave transmitter can receive the signal. Microwave transmission is the most economical method of distributing several television channels over distances in excess of twenty-five miles. Although microwave transmission is limited to line of sight distances of approximately twenty to thirty-five miles, the procedure can be repeated in order to cover greater distances. Both educational broadcasters and common carriers use this form of transmission for long distance interconnections.

In certain cases microwave may also be used for short distance transmission. This is the case when one wishes to send television signals from a production studio to the broadcast transmitter or from remote locations to the production studio. Microwave and closed-circuit can accommodate both the transmission of television and the other types of communications signals previously mentioned.

Instructional Television Fixed Service

Instructional Television Fixed Service (2500 megacycle) was establishe in 1963 by the Federal Communications Commission as a service to provide for multiple channel educational television. This system incorporates characteristics of closed-circuit and broadcast transmission. As with closed-circuit the Instuuctional Television Fixed Service system can accommodate a number of programs simultaneously. Signals may be received at only those sites provided with special antennae and converters. It is similar to broadcast transmission in that it does not rely on cables for distribution, but is transmitted through the air for reception at the selected receiving points. The signal range for this system is between fifteen and twenty-five miles, depending upon the equipment, terrain, and receiving locations. It is limited to line of sight transmission and reception.

Required equipment at the reciever location includes a relatively tall antenna mast, dish antenna and special converter. Once out of the converter and on a VHF channel, the signal is fed into a conventional building closed-circuit distribution system and displayed on regular television receivers.

Other Related Transmission and Distribution Systems

During early development of inter-institutional television it can be anticipated that the level of information to be exchanged will be relatively low. It may be advisable during this period to consider several supplemental systems. Transmission of data and audio using conventional telephone, teletypewriter or other means of interconnections is possible. Among those which might initially be applicable in Minnesota are TELPAK, a bulk rate private line service providing communication capability in such a manner that both voice and data can be accommodated simultaneously. A somewhat similar system, although of lesser capacity, Wide Area Telephone Service (WATS), has the capability of accommodating voice, data and teletypewriter interconnection, but not on a simultaneous basis.

Broadcast television stations may also be used as a means of distributing television materials to institutions prior to the development of direct microwave interconnections. Through the use of broadcast stations, instructional materials may be transmitted during the day, or if necessary, during the late evening or early morning hours for reception and recording. With the use of video tape recording equipment institutions have the capability of recording broadcast material for storage and later playback at hours suitable to the individual campus schedules.

Video tape recorders are similar to conventional audio recorders in that they convert electronic signals into electromagnetic patterns for storage on special recording tape. When the tapes are played back, the original electronic signals are reproduced and result in corresponding reproduction of the television picture and accompanying sound. Video recorders have been available commercially for the past ten years and during this period have undergone much development. Equipment currently available varies greatly in capability and cost with high band color recorders selling for approximately $100,000 at one end and small portable recorders of limited application costing in the neighborhood of $3,000 at the other. Each of these units has its own special strengths and limitations as well as particular applications for which it is best suited. Basically they all serve the same function, that of providing a means for the recording, storage and playback of television pictures and sound. A more complete review of video recorders may be found in the Engineering Report, General Appendix D.

Federal Communications Commission

Television systems utilizing broadcast, microwave, and 2500 megacycle Instructional Television Fixed Service are regulated by the Federal Communications Commission. Closed-circuit systems which do not depend upon microwave or 2500 megacycle to secure their originating signal are for the most part free of FCC regulation.

Identifying Suitable Methods of Transmission and Distribution

As noted earlier, the educator has available a variety of systems for distribution of television and other kinds of educational information.

Each of these means has certain strengths and limitations which should be matched to the instructional requirements of the institutions. Across the country we find educators and engineers working together in the identification and selection of systems best suited to solving the problems involved. South Carolina is perhaps an excellent case in point because of their ten years of experience with a state TV system. There we find a combined use of a state closed-circuit system, a broadcast network and small video tape recorders each being used in ways that best meet the needs of participating schools.

As circumstances vary, so do the variety of methods that are applicable. Factors of time, student population, distance, typography and a number of other considerations all become influencing variables. In making the determination to what systems of distribution and transmission to utilize, it is essential that the present and future needs of the institution be clearly defined in order that the system developed will have sufficient potential and capacity.

Securing Transmission and Distribution Facilities

States or institutions wishing to develop television and communications systems have several alternative ways of securing such services. In some instances they choose to construct their own systems. In other cases they may lease the facilities from existing educational broadcasters, common carriers, such as a telephone company, or, where they exist, community antennae agencies. Service transportation of video tape recordings by Parcel Post or United Parcel Service may be used singularly or in combination.

Several groups are interested in participating in the development of any interconnection within the State of Minnesota. The Twin City Educational Television Corporation, Northwestern Bell Telephone Company, K & M Electronics, Minnesota Microwave, Inc., and others have indicated a willingness to bid on any proposed interconnection within the State. Since microwave systems between institutions of higher education require a considerable capital investment, and are available through either direct ownership or lease, it is necessary in the final analysis to evaluate system needs, comparative costs, flexibility and provision for expansion in attempting to determine whether to lease or build. Often this decision can be reached only after full development of alternatives, preparation of specifications and the bidding process. The requirements specified in General Appendix E are those which must be met whether the system is implemented by a privately owned development or provided as service by a common carrier or educational broadcaster. These specifications have been engineered to have the capability required for exchange of educational television in addition to other forms of educational information.

To provide for future needs, the Minnesota interconnection plan should be designed in such a way that a 525 line broadcast color television program with audio can be transmitted over interstate distances of 2000 to 2500 miles in length. This would allow for eventual interconnection with several other statewide systems. The interconnect should also be such that programs will be of high quality and suitable for use at the end of the distance. The system will also need to supply a multiplicity of services in the future.

Existing Telecommunications Systems in Minnesota

As indicated previously, television facilities in Minnesota institutions of higher education are comparatively scarce. The Minnesota Highway Department has a statewide communications system utilizing telephone and teletypewriter facilities. A number of other state agencies use the General Services Administration TELPAK arrangement within the State for voice communication.

Minnesota Educational Television Network

Five educational broadcast stations, KTCA and KTCI-TV in Minneapolis-St. Paul, WDSE-TV in Duluth, KWCM-TV in Appleton, and KFME-TV in Fargo, North Dakota, are interconnected by microwave relay so that programs may be televised simultaneously over the five stations. The formation of a Minnesota educational television network was announced in February of 1966. The organization is an association of the educational television broadcasting stations noted above. The purpose of the network is to coordinate activities leading to the simultaneous statewide edcuational coverage. The network was active in securing the reservation of channel 9 at Bemidji for educational television use. Translator station applications have been filed for Grand Portage and Grand Marais to bring the Northeastern area of the State ETV programs from Duluth and the Twin Cities.

The network indicates that it now has capability of reaching ninety per cent of Minnesota's population with a usable television signal. Plans are now underway to further develop the broadcast coverage of the State. A study directed to this end is being conducted under Title III of the Elementary and Secondary Act. It is just being completed and should be available within a short period of time.

Each of the member stations operate as a non-profit organization. The Twin City Area Educational Television Corporation was recently granted $363,986 by the Department of Health, Education and Welfare to equip KTCA-TV, Channel 2, Minneapolis-St. Paul, for production of color programs which can be relayed throughout the network. Minnesota stations are operated by private, non-profit, corporations through the aid of interested individuals, organizations and foundations.

Common Carriers

Northwestern Bell Telephone Company has indicated that within the Bell system there is consideration being given to development of tariffs for microwave capability. Under such a new structure, they would lease a certain amount of bandwidth capability and the consumer could utilize such a transmission as was seen fit. Northwestern Bell currently will lease interconnection facilities for telecommunications signal distribution. K & M Electronics Company would also have an interest in contracting for the design and development of this service, on a direct sale basis or as a common carrier. Minnesota Microwave is a microwave common carrier presently licensed by the Federal Communications Commission to serve six CATV systems in West Central Minnesota. They have expressed interest in assisting with the educational interconnection in the State. Central Minnesota TV Cable Company, connected with the Telesis Corporation in Chicago, has extensive cable and microwave CATV facilities presently in operation in the State.

Figures illustrating current microwave distribution systems and broadcast coverage of the Minnesota Educational Television Network are included in General Appendix E.

Space Satellites

Transmission systems utilizing space satellites for relay of educational television materials are being given considerable thought in many quarters. The State of California is currently reviewing the merits of satellite and ground based distribution. The Ford Foundation and COMSAT have proposed to the Federal Communications Commission that a nationwide communications satellite be developed with savings which accrue reverting, in part, to the support of high quality educational television. Further progress in this area will likely have impact on any television development contemplated for Minnesota. While at this time it is too early to identify precisely what the satellite may contribute, future policy may reflect the possibility of advanced technology obseleting, in part, traditional ground base interconnection systems.

Communications Needs of Minnesota Higher Education

Educational requirements for telecommunications were established through a series of visitations and conferences with twenty-one institutions including:

Bemidji State College
Brainerd Junior College
Carleton College
College of St. Catherine
College of St. Scholastica
College of St. Thomas
Fergus Falls Junior College
Itasca Junior College (Coleraine)
Macalester College
Mankato State College
Mesabi Junior College (Virginia)
Moorhead State College
Rochester Junior College

St. Cloud State College
St. John's University
St. Mary's College (Winona)
St. Olaf College
Southwest State College
University of Minnesota - Duluth
University of Minnesota - Minneapolis-St. Paul
University of Minnesota - Morris

In meetings with faculty and administration, representatives of the engineering firm and the Study staff reviewed types of television and educational communication systems in which each of the institutions had greatest interest. Although these discussions reflected the requirements of the separate colleges and universities there was a common element of similarity in their needs which strongly suggested a common basis in certain of the communication services. In relative priority of need and anticipated utilization the requirements have been established as follows: (1) electronic interconnection of libraries for expediting inter-library loans; (2) electronic interconnection for sharing of data and to provide access to sophisticated computers; (3) development of specifications for small closed-circuit and video taping systems; (4) development of specifications for intra-campus closed-circuit production and distribution facilities; (5) access to regional production centers; (6) development of audio interconnection between institutions of higher education; (7) access to broadcast television facilities; (8) access to wide band microwave interconnection for a high level of exchange of television and other electronic communications.

These priorities reflected faculty and administrative belief that inter-institutional cooperation should not in itself be limited to television, or that television is, in many instances, the best place to start such cooperation. Prior to a high level of course and instructional exchange, the institutions saw a need for cooperative sharing of a variety of resources while at the same time developing a basis for a more sophisticated relationship utilizing television.

There was strong interest expressed by the institutions in having ways of sharing each others special library collections. These collections normally are not duplicated at each of the institutions either because the material is no longer available in print or the cost of such duplication is prohibitive. Similarly the institutions found the need for access to high speed computers, an important supplement to facilities already available or planned on many of the campuses. In academic areas where physical access to a computer is not required, an electronic interconnection can make a high capacity computer available as a problem-solving device for instruction or research.

From the engineering visitations it was apparent that television activity occurs where there are television facilities. Faculty members strongly urged, and were supported by their administrations, that production facilities be readily available and close to their areas of work. Institutions feel they need and require such television production capability in close proximity to their laboratories, studios and classrooms.

It was suggested that phone and audio interconnection systems could greatly reduce the need for travel and could serve to increase The likelihood that faculty will work together in the cooperative development of televised instructional materials and the sharing of other resources.

Engineering Recommendations

Using the requests and interests of the institutions of higher education as a basis for their recommendations, the engineering firm also considered developments taking place in other parts of the country, advances in communication technology, anticipated levels of inter-institutional traffic and the funds that would be required for a reasonable initial development.

Electronic Interconnection

To provide for greater sharing of library resources, access to sophisticated computers and telephone type inter-campus communication a Wide Area Telephone Service (WATS) was recommended. The WATS system may be used alternately for voice communication and data transmission. It would provide each of the four-year institutions full access to a WATS line and each of the junior colleges shared access with another junior college. Institutions would then have the capability of making telephone calls to any location within the State of Minnesota at a fixed monthly charge. Cost of this service with related teletypewriter and data equipment would be $362,000 for the biennium.

Regional Production Centers

To meet the needs expressed by the institutions of higher education for television production facilities in close proximity to college campuses, regional production centers were recommended at the six state colleges and the three campuses of the University of Minnesota. Such production facilities would be suitable for the development of many types of useful instructional material but would not be such that they could be considered major facilities. The centers would serve as a basis for intra-campus television production, provide faculties with experience in utilizing television, function as laboratories for the training of teachers and television specialists, and be available for the production of demonstrations, lectures and courses of inter-institutional exchange. Junior colleges and private colleges would have access to such facilities as occasion developed. An estimated unit cost of $166,500 for equipment, site adjustment and operation, the centers would require an appropriation of $1,498,500 for the biennium.

Wide Band Microwave Model Interconnection

To provide needed experience in the exchange of wide band telecommunications signals among several institutions of higher education, it was recommended that a model microwave system be established to accommodate television and other educational communications activities between the University of Minnesota, Minneapolis, University of Minnesota, Morris, and Southwest State College, as well as a similar connection between the state colleges at Mankato and Marshall. It was further recommended that if arrangements can be made, the institutions cooperating in the microwave model should be encouraged to include KWCM-TV, Channel 10 in Appleton, in the interconnection. The microwave interconnection with necessary support, library and television equipment and personnel would require an appropriation of $113,644 per year.

As part of the engineering visitations it was learned that Southwest State College at Marshall had the greatest interest of all institutions in Minnesota in interconnecting at an early date with other institutions. This new and developing college in the Southwestern section of the State is planning a heavy commitment and orientation to instructional technology. Both the University of Minnesota and Mankato State College with television facilities and comprehensive instructional programs have expressed an interest in cooperating with Southwest State College in a venture of this type. These institutions will also benefit in that through the interconnection they will have access to Southwest College's planned dial access audio system.

In developing the estimated cost of this recommendation, Jansky and Bailey proposed a hypothetical microwave system between Mankato and Marshall which would provide duplex or two-way interconnection on a twenty-four hour basis. The Twin City Area Educational Television Corporation, Northwestern Bell Telephone Company, K & M Electronics and Minnesota Microwave each were asked to estimate their cost of providing service for the hypothetical interconnection. Table 4 illustrates the comparative estimated costs submitted by each of the possible bidders. These figures were used as a basis for estimating the cost of the model interconnection and would suggest that the Twin City Area Educational Television Corporation would be the least costly supplier.

As this information would provide an experimental basis from which information would be developed regarding possible further

Table 4: WIDE BAND MULTIPURPOSE DUPLEX MICROWAVE SERVICE

Potential Supplier of Leased Systems	Annual Cost Mankato/Marshall (91 miles)	Annual Cost Marshall/Morris (79 miles)	Annual Cost Morris/Twin Cities (136 miles)	Annual Cost Total (306 miles)	Cost Per Mile/Mo.	Cost Per Mile/Yr.
Twin City Area Educational Television Corporation	$18,922	$16,429	$28,283	$ 63,634	$17.33	$207.95
K & M Electronics	36,912	32,044	55,164	124,120	33.80	405.62
Minnesota Microwave, Incorporated	43,200	37,503	64,562	145,265	39.56	474.72
Northwestern Bell Telephone Company	61,152	53,088	91,392	205,632	56.00	672.00

expansion of a statewide system, the engineering firm recommends that microwave service be leased from the Twin City Area Educational Television Corporation.

Future Operational Research

In its final engineering recommendations, Jansky & Bailey suggest that the State of Minnesota maintain a continuing program of operational research to gain experience and serve as a basis for planning future telecommunication interconnection between institutions of higher education.

The preceding materials represent a summary prepared by the staff of information that can be found in greater detail in General Appendices D & E.

Inter-Institutional Projects

Legislation for the television Study called for experimental inter-institutional activity. The staff believed that this activity should constitute an important part of the Study, and this view was supported by the Statewide Advisory Committee.

To bring about development of the projects, the staff visited each of the state colleges, the various campuses of the University, and a number of public junior and private liberal arts colleges to explain the Study and to encourage submission of proposals of inter-institutional projects which might be considered for funding.

In no case did the Study staff suggest a particular proposal. Institutions were encouraged to examine their current educational relationships and to recommend any projects which might, from their point of view, result in useful inter-institutional activity.

As projects developed, the staff made observations in terms of emerging problems and their resolution. In addition, the Bureau of Institutional Research evaluated the four major projects in order to yield insights into the faculty and student attitudes that exist toward inter-institutional educational television instruction.

The following data resulted from the projects:

Metropolitan Junior College - University of Minnesota

The first project to be funded by the Study provided for the Metropolitan Junior College to receive two television courses from the University of Minnesota in the Winter Quarter of 1966.

The project was suggested by the President of the Junior College, a member of the Statewide Advisory Committee for the television Study.

The Junior College (operating at that time on two campuses, at Central High School and Centennial High School in Circle Pines) expressed a particular interest in the introductory course in cultural anthropology offered at the University which was unavailable due to lack of instructional personnel and funds. This course was planned as an elective for "upper track" students. (Those who are likely to transfer to a four-year institution at the completion of their junior college experience.)

A second course requested in reading and vocabulary development was offered in the University's General College. This course is one designed to be useful to all students.

The anthropology course involved three hours of television lecture each week, with an additional hour of class discussion. One section of this course was offered simultaneously on each of the junior college campuses and at the University. Two additional sections were presented on the University Campus in Minneapolis at other hours.

A qualified instructor for this course was not available at the Junior College. Consequently, a University teaching assistant was selected to lead the discussions at the Junior College and to serve as liaison with the anthropologists at the University who were teaching the television lessons.

Reading and Vocabulary Development, the second course in the project, includes twenty-five hours of video tape instruction with the remainder of class time devoted to discussion and tests. In this case, supervisory faculty at the Junior College were selected for the course. They had responsibility for management of the course, use of related materials, and direction of the undergraduate teaching assistants. The University instructor provided the related materials and coordinated the class with the Junior College faculty.

In the Winter Quarter of 1966, 365 students at the Junior College registered for the reading course and thirty-one students registered in anthropology.

A number of observations were made by the Study staff about the problems encountered in the project. These problems along with a project evaluation by the Bureau of Institutional Research of the University of Minnesota follows:

Technical Considerations

One of the problems in establishing a means of transmission was the assessment of costs of various methods available. Two methods seemed most practical at the time. One was the use of a microwave service provided by Northwestern Bell Telephone Company. The other was the use of the broadcast facilities of KTCA-TV.

The microwave interconnection cost was $2,959.99. The KTCA-TV management did not choose to provide firm cost figures for the project or to participate in any way. As a result, the staff had no alternative but to use the microwave facility.

In order to provide some comparison of the difference in costs between the two methods, the staff, using KTCA's current charges to the University, made a preliminary estimate of costs of broadcast transmission based upon an effective hourly rate of $189 (the KTCA rate of $170 per hour, less the University's 10% discount plus a charge of $36 for each hour of tape playback). The broadcast transmissions would thus cost $9,828 for the general reading course for fifty-two lessons. The transmission for anthropology would cost $7,560 for the forty lessons involved. It should be recognized that these are only estimates based on University rates for broadcast transmissions.

This experience would suggest that the choice of a transmission method for an inter-institutional project depends upon the following factors: (1) the number of transmissions required; (2) the availability of the transmission facilities at the hours needed; (3) the number of students involved; (4) the location of students.

Scheduling

An unexpectedly difficult problem developed in scheduling the courses to be offered. While the Junior College calendar is the same as that of the University, the daily class hourly schedule is different, making simultaneous transmission impossible for some sections. This also necessitated several extra playbacks of video tapes.

In addition, the morning session of the reading course at Central Junior College did not correspond with the presentation of the tapes on the University campus, requiring a special playback. It was also necessary to play back an extra tape each week to accomodate a discussion session at Centennial Junior College.

It should be recognized that institutions need to maintain some flexibility in scheduling. The Junior College administration and faculty were highly cooperative. It is true that the local needs on each campus had established a particular pattern of hourly scheduling of classes that called for special arrangements for the use of the inter-institutional materials. This clearly must be recognized in any planning for the use of televised materials.

Faculty Relationships

Faculty attitudes at both institutions appeared to be favorable toward the project. The Junior College faculty cooperation was requested and received. This meant that they would agree to accept the two courses as part of their curriculum and responsibility for supervising the reading course.

The University faculty members showed considerable interest in supplementing television instruction at the junior colleges. The anthropology teachers arranged special conference hours for junior college students who wished counseling, and supervised the teaching assistant who worked on the project. The reading instructor wished to appear at the Junior College in person during the quarter to establish a relationship with the students.

It is important to recognize that faculty members at the institution where the course originates appear to feel strongly that it is necessary to know how the course is to be utilized. This consideration helps maintain academic integrity and the quality of their work. On the other hand, the faculty of the institution using the televised materials have a similar feeling that they must be responsible for the course as it relates to their institution. Their right to maintain the integrity of their curriculum is one which is important to the quality of the educational program for which they are responsible. These two significant roles were mentioned and discussed by faculty involved in the project. It seems clear that a relationship must develop in which each institution recognizes the legitimacy of the interest of the other.

Faculty Compensation

The way in which participating faculty shall be conpensated for inter-institutional television services has not been resolved. The Study decided to leave the matter in the hands of those planning each project, provided salaries were responsibly handled. In the present project, the rate paid to extension faculty of the University was suggested as an already existing standard for determining faculty salaries. This was agreeable to the faculty members. All agreed that the teaching assistant in anthropology should receive the half time salary of a University teaching assistant, since he assumed responsibility for the sections at both the Central and Centennial Junior Colleges.

The staff noted the uncertainty of faculty and administrators about the most equitable rate of pay for this kind of activity. The lack of experience in establishing compensation appeared to lead in this case to the choice of the Extension standard.

Operational Considerations

A number of minor problems with equipment, materials related to the courses, and scheduling occured in the project. The staff felt that most were due to the fact that no system of distribution had existed between the institutions prior to the project.

A technical problem involved a deterioration of the microwave signal to the Central campus that could not be eliminated or identified for several days. There was testimony that this led to unfavorable student reaction. The remaining problems appeared to be related to the fact that this was a new course situation. Problems of registration (more students registered at Centennial than expected, for example, requiring the use of a room not originally scheduled for television viewing), were no more difficult in the view of Study staff, than might be encountered the first time a course is offered by conventional methods.

In short, the observation of Study staff is that the technical problems encountered were not inherent in inter-institutional television instruction and could, with experience and more time be reduced or eliminated.

Cost Considerations

The total cost of the inter-institutional project involving the Metropolitan Junior College and the University was $11,060.16. This amounts to a quarter hour cost of $5.58 in Reading and Vocabulary and $20.12 in Anthropology 2 which represents a favorable cost comparison with conventional instruction.

It should be borne in mind that the microwave could have been used in any operational situation for additional materials or for other purposes (since it was available twenty-four hours a day without additional cost). Consequently, any increase in usage would reduce the cost on a per hour basis.

After an examination of the cost data, as shown at the end of this section, the Study staff concluded that the project was economically feasible. While the staff believes that economic considerations are not the only reason for using inter-institutional course activity, the facts appear to indicate that costs are no barrier to such activity where educational purposes can be served.

Evaluation

An evaluation of student and faculty attitudes toward inter-institutional television by the University of Minnesota Bureau of Institutional Research was arranged. The complete report of this evaluation is included in General Appendix B.

Generalizations were made of the data received by interviewing faculty and others involved at the participating institutions and by a questionnaire survey of faculty and students are included here.

(1) Faculty members tended to be undecided about many facets of using television for instructional purposes, probably due in part to the lack of experience with the media.

(2) Faculty members can see some advantage in using inter-institutional television instruction, particularly making outstanding scholars and teachers available to students.

(3) Faculty members tended to agree that television should not be used exclusively for many courses.

(4) Students could recognize that television is advantageous for courses requiring much visual material.

(5) Students were rather non-committal about taking courses by television, being neither enthusiastic about it, nor disliking it particularly.

Thus, the data gathered as part of the Metropolitan Junior College-University of Minnesota project appears to indicate inter-institutional television is accepted by students and faculty in the same manner as locally produced television and is economically feasible.

Mankato State College-Austin Junior College

The Study staff visited Mankato State College to explore the possibility of participation in the television study through the development of an inter-institutional project. The Mankato State College Television Committee and representatives of the College subsequently met with the Dean of Austin Junior College and members of his staff to arrange the sharing of a Mankato State College course, Healthful Living.

This television course is taught by the Chairman of the Department of Health at Mankato State College, and is offered at two separate hours four days a week on the closed-circuit system of the College.

Austin Junior College offers two health courses, one in personal health and the other in family health. Each carries two quarter hours of credit. The Mankato course is concerned with both subjects.

Therefore, the Junior College selected those lessons which most closely related to their own personal health course.

Faculty discussions took place between the television teacher at Mankato and the supervising teacher at Austin Junior College. Decisions were made as to which of the television lessons would be most useful at Austin, what kind of course outline should be used and what revisions should be made in tapes that would be beneficial for the shared use of materials.

This project was proposed to the Statewide Advisory Committee and was approved for funding. In the opinion of the staff, the project presented some important differences from the Metropolitan Junior College-University of Minnesota project. These were as follows:

(1) The second project involved a state college and a junior college and the first the University and a junior college; (2) tapes were mailed and reproduced on a playback unit at the junior college in the second project, where the first involved direct transmission from one institution to the other; (3) only selected portions of the course were used, rather than the entire course; (4) staff members at the junior college participated in the development and presentation of an introductory video tape to be used with the materials; (5) it was used as part of an adult education evening course as well as for regular college instruction.

As in the first project, some observations were made by the staff about the development of the project which should be made a part of the data of the Study.

Technical Considerations

Three methods of transmission of the material from Mankato State College to Austin Junior College were possible. One was to prepare a set of tapes for Austin to use on a tape playback system to be provided by the Feasibility Study. A second was to set up a microwave interconnection similar to that used in the previously reported project. A third was to broadcast the material using the commercial station at Mankato or Austin.

Estimates clearly indicated that preparation of tapes for use at times scheduled at Austin was the most feasible method. A comparison of estimated costs is as follows:

Video Tape Playback	$2,002.50
Microwave	5,115.00
Broadcast (KEYC-TV, Mankato) $ 72.75/hr. mornings 127.00/hr. afternoons	4,794.00

With these estimated costs in mind, the Study staff requested the Audio Visual Service of Mankato State College to assume responsibility for preparation of a duplicate set of selected video tapes at a cost of $11 per tape. The tapes were then sent to Austin where they were played back on a video tape recorder.

Scheduling

Availability of video tape recordings at Austin permitted the Junior College and Mankato to use the courses without the need of adjusting class schedules. This flexibility also permitted scheduling of an evening adult education course.

Faculty Relationships

As in the first project, there was willingness by the faculty to explore the uses of television for instruction. In this project, faculty from the two institutions worked together on selection of tapes, revision of several tapes and production of an introductory tape. The television instructor was willing to provide the Junior College faculty with the televised lessons, related instructional and evaluational materials.

The Junior College faculty cooperated by accepting the project materials as a part of the curriculum. They also discussed the choice of materials and possible revision with Mankato faculty members. This resulted in a more direct discussion among faculty from the two institutions than did the first project.

Faculty Compensation

As in the previous project, faculty compensation was determined by the institutions rather than by the Study staff. A Mankato State College Television Subcommittee recommended that the duplicate sections of a two quarter hour course and one adult education non-credit evening course be treated as one four hour course. Since a normal schedule for nine months is ideally no more than twelve quarter hours per quarter, the subcommittee recommended that salary be determined on a basis of one-ninth of a regular teaching salary for an academic year.

The two Junior College faculty members involved were paid a stipend based on annual salary for participation in the research and organizational aspects of the course.

Thus in this project, another salary standard was recommended, based on annual salary. Again, the standard was quite acceptable to participating faculty members. It should be recognized that this was a first evaluation of salary by a regular academic committee for this type of inter-institutional application, and experience might lead to reevaluation.

Operational Considerations

In this project, no particular technical difficulties were encountered.

One of the concerns expressed about the placing of video equipment in a new location is the question of its service and maintenance. In this project, two student operators (from Austin Junior College) were trained in the operation and cleaning of the video tape recorder. An instructor in electronics at Austin Vocational School agreed to assume responsibility for local maintenance of the equipment. There was no evidence that this method of assigning maintenance and operational responsibility is not feasible and the method proved to be entirely satisfactory.

Cost Considerations

It is difficult to compare costs of this application of television to instruction with the first project. In this case, the instructors at the Junior College continued to be associated with the course. All costs are in addition to costs now incurred for conventional instruction in the same course sequence.

The experience suggests that a relatively modest investment of $4,592.33 allows faculty members of two or more institutions to work together to make their course materials more effective through the use of television. While there is a cost involved, this did not appear to be at all unreasonable for the kinds of benefits achieved.

Evaluation

The Bureau of Institutional Research completed an evaluation of the project which is included in General Appendix B. Administrators and faculty involved in the planning of the project were interviewed. Attitudes and opinions of other faculty at Austin Junior College were obtained by questionnaire. Student opinion was similarly obtained. Results were similar to those in the first project. The generalizations follow:

(1) Administrators and faculty members participating in the project were favorable to the use of inter-institutional television for instruction.

(2) Participating faculty and administrators felt that some provision should be made for more student participation in the course.

(3) A survey of the entire faculty of the Junior College indicated that there were many phases of instructional television about which they were undecided.

(4) Large proportions of the faculty agreed that television can be useful as an instructional device, particularly to teach parts of courses and to present demonstrations and experiments.

(5) Faculty thought that closer relationships among departments in different institutions would develop as a result of cooperation in inter-institutional television.

(6) Student reaction toward the use of television for the course and the use of inter-institutional television seemed favorable, slightly more so than in the first project.

Again, the Bureau results would tend to support the proposition that inter-institutional television for instruction is feasible.

St. Cloud State College-Mankato State College

The staff of the Television Feasibility Study met with representatives of St. Cloud State College to explore the possible development of an inter-institutional project. As a result of the meetings, an inquiry was received by the staff from a St. Cloud College professor regarding the possible funding of a research project which would provide special television materials for a course, Guidance Principles. The course was scheduled to be offered during the Spring Quarter of 1966 over KTCA-TV. The professor contacted faculty at the University of Minnesota as well as faculty at several private and state colleges regarding their interest in joint use of the course.

These inquiries resulted in the development of a relationship between faculty members at Mankato State College and St. Cloud State College providing for the following agreement: (1) faculty members from both institutions would consult regarding the planning of individual television lessons; (2) a Mankato State College professor agreed to serve as liaison person and to participate in at least one of the telecasts; (3) video recordings would be made of the television lessons transmitted over KTCA-TV during the spring quarter for use as supplementary materials in the summer session counseling and guidance courses at Mankato and St. Cloud.

Pursuant to this agreement, the cooperative planning described took place and video tape recordings of the eleven television lectures offered over KTCA-TV in the course Guidance Principles, Psychology 480-588, were made. These tapes served as the basis for the inter-institutional use of the materials in the first summer session of 1966.

The Twin City Area Educational Television Corporation was advised of the interest of the two institutions in completing this project. KTCA-TV agreed to make video recordings of the St. Cloud State College course, permit the use of the tapes with students and faculty at the two colleges, and to assume responsibility for the production of remote recordings that might be required. While the KTCA-TV staff did not wish to offer an appraisal of the project, they did note that St. Cloud State College had achieved excellent results over a long period without undue complications or excessive costs and that past St. Cloud experience should be of considerable value to the Study.

To enable the faculty at Mankato and St. Cloud State Colleges to work together on planning, the Study funded a telephone interconnection (conference-phone) between the two institutions. Subsequent cooperative planning between the colleges resulted in the development of effective instructional materials for classes in counseling techniques and procedures.

Various course materials were developed. Two half-hour video tape demonstrations of counseling techniques were produced in the KTCA-TV studios.

The St. Cloud College State College professor served as counselor and two high school students assisted by acting as counselees. One of the counseling sessions was subjected to a video tape critique by a national counseling authority. In another situation where course materials were produced, counseling sessions at suburban high schools were taped. Two half-hour video tapes were made that illustrated group counseling procedures in two distinctly different groups. Nationally known counseling authorities were asked to submit reactions to these sessions, and the reactions constituted summary lessons for the course developed in counseling. During the summer of 1966 these materials were used in group counseling instruction at both Mankato and St. Cloud State Colleges. In all, eleven tapes were produced during the spring broadcast series.

Technical Considerations

The course was part of a regular St. Cloud State College offering on KTCA-TV during the spring quarter. It was initially decided to record the series on video tape through off-the-air pickup at Mankato (an off-the-air pickup occurs when a conventional broadcast signal is received and recorded in a manner similar to receiving a signal for a television receiver). KTCA-TV agreed to this arrangement and to the use of the tapes as previously described.

It soon became apparent that consistently better quality could be obtained by placing a tape recorder in the studios of KTCA-TV and recording directly. This was arranged.

Representatives of the Twin City Educational Television Corporation wrote to the Study staff that the KTCA contract was with St. Cloud State College and the Corporation preferred working with them. The Study was advised by the station that it would not be proper for the staff to interpose itself into the contractual arrangement--particularly where technical matters were involved which might affect educational television. The Twin City Area Educational Television Corporation was also concerned about any possible commitment of KTCA-TV facilities without approval. As a result, it was arranged that the television instructor would work directly with the station and that the Feasibility Study would work through him on this project.

At one point, KTCA-TV personnel exhibited concern about problems in quality with remote recordings to be made at Osseo High School. However, the television instructor felt that the educational objectives he had in mind made it important that this be done and the tapes were made.

Faculty Relationships

As in the first two projects, faculty relationships which developed during the project were excellent. Faculty members at Mankato State College and St. Cloud State College engaged in a series of conversations which brought about development of the televised materials for the course. The Study, in order to facilitate the conversations, paid for a conference telephone line between the two institutons. At first, this line was not used. Minor problems occurred as faculty members learned to use the line (on one occasion, the faculty group called the wrong number, and in another, a blizzard intervened). However, the line was much more frequently used as the project developed and the two groups asked the Study staff to continue this line at the end of the project so that conversations in connection with the project could be continued.

Faculty Compensation

The television instructor was paid a small stipend for his participation in the research and administrative aspects of the television project. National authorities also participated in the preparation of special tapes or appeared live at the KTCA-TV studio and received modest honoraria ranging from $50 to $100.

In return for his assurance that the video tape recordings would be available for his future use, the instructor granted St. Cloud State College and Mankato State College the use of the tapes for instructional purposes.

Operational Considerations

One problem which occured during the project was the difficulty in recording off-the-air at Mankato. It was decided that better quality would be achieved if the recordings were made directly at the KTCA-TV studios.

At one point in the spring quarter, the television instructor reported difficulty in securing arrangements for taping national experts in their own localities. Problems included the inability to secure studio time and excessively high production costs at an Eastern television studio.

The video recordings were played back on portable recorders at both colleges during the summer. Student operators and faculty supervisors reported that there were no technical problems.

Cost Considerations

The Television Study assumed responsibility for all costs directly related to the experimental use of the video tapes including production of special studio and remote tapes, off-the-air recording of original lessons by the Audio Visual Service at Mankato State College, video recording of original television lessons by KTCA-TV, production of a duplicate set of video tapes at Mankato State College, installation, and operation of a video tape recorder and two twenty-three inch television receivers at St. Cloud State College during the summer session of 1966, expenses for speaker phone terminal equipment and resulting toll charges for inter-institutional conferences.

These costs must be thought of as supplementary to the conventional costs for the course. However, as in the Mankato-Austin project, no replacement of instructor time was contemplated. Rather, the goal was an improvement in the quality of materials available for the course by utilizing the original television lessons for other instructional purposes.

Evaluation

The analysis of the responses of students and faculty involved in the St. Cloud-Mankato project appears to justify the following generalizations:

(1) Students in all five summer session classes were predominantly favorable to the course, with Mankato students being slightly more favorable.

(2) The five instructors were also favorably disposed toward the project, indicating that it had demonstrated the feasibility of inter-institutional cooperation of this kind.

(3) A corollary analysis indicated that there was a positive relationship between attitudes of students and those of the instructor who taught the class.

(4) Although the numbers involved in the spring assessment were too small to permit a statistically significant judgment, evidence indicates that there was a strongly favorable response to the course as taught on KTCA-TV in the quarter in which it was being recorded for the summer project.

(5) There appears to be no significant difference in the response of students on the campus where the instructor is not employed and the campus where he is. In other words, the inter-institutional aspect of educational television materials did not seem to be important to students, as in the Metropolitan Junior College-University of Minnesota project.

Austin Junior College-Rochester Junior College

In the Spring of 1966, a faculty member at Austin Junior College who had gained experience with television while using the Mankato health course contacted the staff to determine if the Study would consider funding a proposal for the preparation of televised materials to be used in a chemistry course for nurses. The course is regularly offered by conventional instruction at Austin Junior College and Rochester Junior College. Through contact with faculty members at Rochester Junior College, he knew of their interest in such a project.

Shortly after the Study confirmed that a project of this type would be considered, the staff received the proposal for development of materials to be used in the nursing course.

The statement is reproduced in full because of the careful thought which underlies the proposal and the insight which it provides into the way in which faculty approach inter-institutional situations.

> I. That the above mentioned colleges develop and record on video-tape for their mutual use and benefit a series of lectures and demonstrations to be used in their chemistry courses designed for diploma nursing programs in both communities.
>
> II. That these video-tapes should be at an average of about 20 minutes duration, presenting major concepts and utilizing demonstrations which would normally be difficult to demonstrate to large classes.
>
> III. That the video-tapes be designed as a nucleus of course content and be supplemented by comment, lecture, and discussion following their viewing by the class. The use of video tape would be restricted to topics which lend themselves to this type of presentation.
>
> IV. That the recorded materials be used and their merits assessed for the 1966-67 academic year, to study the positive and negative aspects of such a course format.
>
> V. That the design of such a course should present the following advantages over the existing method of instruction:
>
> A. Standardization of course content to insure proper introduction to concepts considered essential in the training of nurses, thus assuring familiarization of all students with the major concepts.
>
> B. Conserve time normally consumed in the presentation of graphic and demonstration materials due to the immediate accessability of such materials when programmed for viewing on video-tape.
>
> C. Allow the use of demonstration methods and materials which would be too small to be viewed by all members in a large class.

D. Afford implementation of resource materials and personnel into the course which would normally be difficult or impossible to schedule during class meetings. Particular emphasis here is placed on the use of specialized personnel within the medical field, or local laboratory facilities.

E. Permit a concentrated effort during the summer months in which all energies may be directed toward the improvement of one course, both in content and method of presentation.

F. Insure the best interests of the student by utilizing the instructor to maintain a personal contact with the students, thus uniting the video-tape and the student reactions to the materials presented therein.

G. Prepare a more meaningful and interesting presentation by utilizing a faculty committee for preparation of the academic materials and experienced production personnel for the technical considerations of its recording.

H. Prove the worth of a cooperative effort among the Junior Colleges in promoting better methods of instruction and in coping with technological advances which merit consideration as instructional devices.

I. Provide experience in preparation and recording of video-tape courses which could lead to an expansion of this method of instruction to other courses.

J. Provide to the student personal contact with the instructor coupled with the efficiency and resource potential of television presentation.

The proposal was funded and the televised course materials were video recorded in the Summer of 1966 for playback to classes during the fall and winter quarters. The Study staff, recognizing the interest of of instructors in producing televised materials of high quality, provided supporting personnel in the form of a producer-director, other directors, graphic arts and clerical staff.

Arrangements were made with KROC-TV, the commercial television station in Rochester, for television studio time and personnel to produce the materials.

Thus, the Rochester-Austin project was different from each of the preceding projects reported in a number of ways: (1) it involved two junior colleges; (2) it arose as a result of the experience of a faculty member at one of the junior colleges with instructional television; (3) it involved the use of commercial television station facilities for production; (4) it involved a comparatively high level of production assistance for faculty members working on the project; (5) it involved a provision for a high level of interaction between faculty members from the two institutions working on the course materials and between faculty and the technical staff provided; (6) it involved short segments of televised materials especially designed to take advantage of the special needs of the courses and the availability of able persons in the area of the two institutions.

Technical Considerations

An important feature of the project was the use of production facilities at television station KROC. The station cooperated generously, even extending the time of the production period in order to accommodate the needs of the project. However, it should be recognized that a commercial station has demands placed upon its studio facilities that can make scheduling of production time difficult, and some problems in scheduling emerged, particularly in the early stages of the project. It should also be recognized that commercial station personnel may not be accustomed to educational materials and production, and this inexperience led to some production problems in the project. Nevertheless, the opinion of staff and the project participants was that the arrangement is a feasible one for production where it can be arranged.

The helical scan tape recorder used to record material at Austin failed to function satisfactorily and required replacement. Another significant feature of the project was the close cooperation between production personnel and faculty. Technical personnel were involved in planning of the materials from the outset of the project. A number of staff conferences were held at which technical staff and faculty members evaluated their progress, methods and approach.

The producer-director was an experienced member of the production staff at KFME-TV, Fargo, on leave to work with the project, making possible close liaison between television personnel and educational personnel. Two additional directors aided in the production of the tapes and made it possible for each faculty member to establish an individual working relationship with a director. The producer-director commented that this had been one of the most important features of the project. Daily contact among these individuals led to a better understanding of educational problems by television personnel and to a better understanding of television problems and capability by the instructors.

The tapes prepared during the summer of 1966 are now in use at Rochester Junior College and Austin Junior College and there have been no technical problems on either campus.

Scheduling

To accommodate the scheduled use at Austin and Rochester Junior Colleges, duplicate sets of the tapes were provided for each institution. Because this method of distribution allows each institution to schedule its own use, no problems of scheduling developed in the project.

Faculty Relationships

This project allowed the continual contact of faculty members from two junior colleges over a comparatively long period. Faculty indicated that they all benefited from the association. Each obtained a better idea of the point of view of the others, and the course materials prepared represented the best judgment of all.

The faculty relationships with television technical staff also were beneficial, according to the testimony of the group. A number of new ideas arose from the group discussions (such as the possible development of a special NDEA Institute in television media usage to assist in training teachers).

An interesting development has been the use of the prepared materials by instructors who were not involved in the original project preparation. This fall, the courses are not being taught by the instructors who prepared the materials. Evaluation of the instructors is included in General Appendix B.

Faculty Compensation

Since the three faculty members in the project would be working on a long-term basis during the summer period, a weekly compensation equated to their normal annual pay was computed, an arrangement which appeared to be satisfactory to the instructors.

Operational Considerations

A number of operational situations had to be resolved during the period of the project. It became apparent during the summer that too little time had been allowed for the preparation of the materials.

Scheduling of studio time, arrival of materials, and preparation of visual materials and aids all required an extension of time. This was arranged.

Because the materials suggested were in a subject area in which television station KTCA-TV had already prepared a course, the staff asked if the faculty members wished to consider using those materials if they should be made available. The faculty felt that the use of a full course was not acceptable and that they wished to have materials which related directly to the needs of their students and which took advantage of the presence in Rochester of especially able people who might be included in the preparation of taped materials.

Because of a decision by staff that video tapes would be rented rather than purchased (the result of a wish not to expend study funds for permanent equipment items), a problem has arisen regarding the disposition of the tapes. The junior college faculty members would like to preserve and use the materials beyond the period of the Study. An operational decision must be made by the staff about the possible purchase of the tapes for the junior colleges. This decision is one which illustrates the difficulty for institutions of building into budgets sufficient funds to take advantage of an opportunity to develop or obtain televised materials.

One of the important features of the project was the use of special production and graphic arts assistance. The development of special charts and graphs and of other special features such as cartoons were made possible. Such materials were intended to illustrate significant chemistry principles more clearly than could be done by use of conventional visual aids while lecturing to large classes.

The producer-director, in a final report, concluded that the project had shown that inter-institutional television in terms of production was feasible. However, in any continuing operation he would recommend that adequate production and technical personnel be provided. During the Austin-Rochester project the directors were required to perform a number of other tasks not directly related to their immediate production responsibilities.

Cost Considerations

This project allowed some assessment of the costs that would be incurred where faculty were asked to identify the kinds of assistance they needed to produce special televised materials for a course.

The faculty identified through their requests, a number of different kinds of assistance: (1) production assistance; (2) graphic arts support; (3) a stipend for a period sufficiently long to develop the materials jointly.

About a fourth of the total cost of the project ($15,819) was for faculty salaries. Another fourth represented production assistance. Another 20.3 per cent was spent on graphic arts support.

The costs of the project were supplemental to the cost of conventional instruction for the course. However, as in the case of the St. Cloud-Mankato project and the Austin-Mankato project, the playback of the materials during several quarters would reduce the per student cost of the materials sharply.

It should be borne in mind that this project attempted to allow faculty to develop the materials as they saw fit. Even in that situation, the costs did not prove to be unreasonable for the development of special supplemental materials of value in improving the course.

Evaluation

Evaluation of the experiences of the three instructors who produced a course during the Austin-Rochester project appears to support the following conclusions:

(1) Cooperation on an equal basis between staffs of two State Junior Colleges to produce a course for use in the curricula of both colleges is definitely feasible;

(2) Joint ventures of this sort are heavily dependent for their success on compatible personalities among the participants, adequate time for both pre-planning and production, and sufficient technical staff and budget support to free instructors for preparation and presentation;

(3) On the basis of this project, use of a commercial studio is less preferable than using an educational television studio which is accustomed to giving full support and highest priority to production of quality instructional television.

Bemidji State College-Renown Properties Computer

The Feasibility Study funded a project at Bemidji State College for the Fall Quarter, 1966 to provide experience with a non-television communication system. The project provided access through a teletype unit to a computer for instructional and other purposes. This made possible the offering of a business course, "Introduction to Data Processing", in which students were taught fundamental principles of punched card equipment as well as techniques for the use of computers by programming simple business problems. Use was also made of the computer for calculations of ACT scores by the counseling staff and by the Women's Physical Education Department for calculations of test scores in a research project.

The GE 255 Time Sharing Computer System is operated by Renown Properties, a subsidiary of Pillsbury in Minneapolis. Rental charges were on the basis of $100 or $400 per month depending upon the amount of computer time and capacity required by the user. The maximum charge provides 10,000 seconds of computer time, unlimited connect time and 60,000 characters of storage. Additional charges were made for installation of a 33 Teletype Unit with an eight channel paper type punch and reader at $105.15 per month. Information sent to the computer by the teletype unit is relayed by telephone line. This involves an additional charge for long distance fees according to use. As charges for line time and access to the computer are based on the amount of time required for transmitting information, the use of a special language, BASIC will aid in keeping costs at a minimum. The language BASIC is a simplified form of the FORTRAN language used by industry.

Telephone line charges are a particular problem as Bemidji is 250 miles from the Minneapolis location of the computer. The time required for transmitting large volumes of data input and output present another problem because of the slow speed of teletype and the transfer rate between teletype and computer. The Bemidji report of the project concluded that "The installation is an excellent teaching aid, and it has much of the capability of a large scale on-site computer . . . . Even with an on-site camputer, a time sharing system similar to this would give the institution more flexibility in the utilization of the computer if access could be obtained any time of the day from remote parts of the campus."

The College plans to continue use of the installation at their own expense for the presentation of courses in business and mathematics in the Winter and Spring Quarters of 1967. In order to obtain maximum utilization of an available WATS line, the college plans to schedule some evening laboratory sessions.

Concordia College (Moorhead)-University of Minnesota

The Feasibility Study participated in the television phase of an experimental German project during the academic year, 1966-67. This project utilized an experimental course format for the teaching of beginning German. The course was developed as an instructional system using programmed texts, audio and video tapes accompanied by periodic evaluation of student progress. The German project is coordinated with a research project in the Center for Research in Human Learning at the University of Minnesota.

The performance of the 18 students at Concordia and the 70 students at the University of Minnesota who were enrolled in the course indicated a degree of success in this method of instruction. The fact that none of these students were performing at the D or F level further indicates that this system significantly aided average and below average students. A measure of student satisfaction is implied by the fact that none of the students have dropped the course.

The only class sessions held are the scheduled broadcasts of video tapes. The tapes have been designed to coordinate the system and to add motivational dimensions, as well as to incorporate the use of German in social situations midway in the course. Tutorial sessions are held with each student semi-weekly for evaluative purposes. The instructors who conduct these sessions are specially-trained to use the instructional system.

The instructors at both colleges found the combination of instructional materials used to be quite satisfactory. The Concordia instructor who is a member of the German Faculty at that school felt that the individual testing sessions were of particular value as planned in this project. He further believes that student performance under this system is better than under a traditional format.

Cooperative development of this type of materials will be continued apart from the Study.

Concordia College is attempting to obtain special funding in order to continue the televised portion of the program.

Unfunded Inter-Institutional Projects

Project proposals were submitted to the Feasibility Study by colleges throughout the State. Reasons for not funding projects were varied in most cases due to lack of adequate funds at the time the proposal was received. In some cases it was impossible to make the necessary arrangements for providing a desired course when requested. Other sources of funds or arrangements were provided in certain instances.

Fergus Falls-Morris-Wilmar

A proposal was submitted to the Study in June of 1966, by Fergus Falls Junior College, Wilmar Community College and the University of Minnesota-Morris, for the production and development of a mathematics course for non-math majors in liberal arts. In addition to presenting a general mathematics course not currently offered at any of the three schools, it was felt that this cooperative venture would enable them to weigh the advantages and disadvantages of planning joint curricula and the sharing of faculty members. The combined effort would also provide new insights into the use of television and its scheduling possibilities.

The project was not supported for the 1966-67 period due to lack of available funds and the time at which the proposal was received. However, funds will be sought from other sources for development of this project. Negotiations among the three schools concerning inter-institutional television resulted in cooperation among individual faculty members in dealing with the development of instructional materials which may well continue.

These same colleges expressed an interest in receiving a statics course from the University of Minnesota which could not be prepared due to lack of available staff during the spring quarter at the University for development of a special television course in this area. Another project pursued with the University of Minnesota and the three schools was the possible use of tapes of a history of World War II course. The faculty of the University of Minnesota History Department felt that the course would not be suitable for these schools as it was currently being used only as an upper division and graduate course. A further interest was expressed in the use of Cultural Anthropology, Geography I or Sociology 45 as alternates to the history course but arrangements could not be made for substitution of one of these due to insufficient time.

University of Minnesota,Duluth-Mankato State College

The University of Minnesota, Duluth, expressed an interest in the development of a telelecture debate project with Mankato State College in the Spring of 1966. Scheduling difficulties prevented development of the debate program. The project, as planned, would have utilized rented telelecture equipment. It was estimated that a charge of $60 for the installation of each telelecture unit and a minimum fee of $27 for one and one-half hours of station-to-station line time between the two colleges would be made by Northwestern Bell Telephone Company.

Crookston Technical Institute-University of North Dakota

During the early part of 1966 conversations between Study staff and the Dean of the Crookston Technical Institute about possible projects led to a meeting between represenatives of the University of North Dakota in Grand Forks and the Crookston Technical Institute to discuss the use of a televised liberal arts course at Crookston to be furnished by the University of North Dakota. Unfortunately, by the time the plans had developed to a point where the Crookston staff thought it was appropriate to ask for consideration of the project, Study funds had been committed.

A result worth noting is that the conversations between two institutions in adjoining states did take place and that a course is now being furnished for Crookston with the instructor traveling to the Crookston Technical Institute from UND rather than using television as a way of offering the course.

Other Related Television Developments in Minnesota

While there has been little formal use of inter-institutional television in Minnesota, there have been a number of examples of cooperative projects among the schools and colleges--both public and private.

Inter-institutional cooperation in the use of educational television in Minnesota has been the result, in many cases, of providing an answer to the instructional needs of institutions. In the case of the diploma schools of nursing, televised instruction was seen as a solution for offering college level courses for student nurses. An arrangement between the University of Minnesota and International Business Machines of Rochester allows employees of the firm to take advantage of college and graduate level courses for credit at a convenient location.

Concordia College (Moorhead)

In order to make the teaching of freshman English as a required subject more meaningful to college students, it is important to evaluate the problems involved. In discussing possible solutions, Concordia College faculty members developed a number of assumptions about the teaching of this course. As a result of these discussions, a series of lecture classes was tried with a separate classroom teacher for smaller groups. As the lecture classes expanded, it was felt that some other method of presentation should be tried.

Concordia College received a Hill Foundation grant and was able to utilize television facilities at Fargo-Moorhead (KFME-TV, Channel 13) to produce sixty lectures on video tape to be used for later broadcast in freshman English classes. The television lecturer teaches a specific assignment, prepares his own quizzes and exams, and reads student papers assigned in the lecture period. He teaches nineteen or twenty of the thirty-nine class periods in the course and is responsible for determining a certain percentage of the students' final grade. Each section enrolls a maximum of twenty students and the teacher of the discussion section is able to utilize free time for consultations and other duties.

The Psychology Department has evaluated the project by comparing those freshmen in the television classes to a group not taught by television. Large lecture sections are utilized by both schools as part of the experimental course. The conclusion of the initial comparison of students was that the project was going well and that students "perform at least as well under these circumstances". This project will be continued in 1966-67 offering three separate English courses broadcast over KFME.

Minnesota Council for School Television

Probably the lengthiest and most extensive project involving a combined effort among schools has been that of the teaching of Spanish to elementary students over KTCA-TV, Channel 2. The Minnesota Council for School Television was formed in 1959 by twenty-seven school districts as an outgrowth of interest in the use of televised instruction. The teaching of Spanish was chosen as the first project of this group and was first offered in 1960. A three year sequence in Spanish continues to be offered to approximately 28,000 students in both parochial and public schools. Fourth, fifth and sixth grade levels in more than 40 school districts receive this instruction. This figure includes certain Wisconsin districts as well as parochial school affiliations.

Other organizational groups have been formed regarding television instruction at the elementary and secondary level, such as the Council for Instruction of French by Television, and councils dealing with modern mathematics and earth sciences. While these groups have involved a number of school districts in Minnesota and Wisconsin, the largest district, Minneapolis, has never been a member of any of the councils. The St. Paul district, as well, does not hold membership. Both of these districts are entitled to use council programs without charge if they wish because each school supplies programs for council use.

Minnesota Private College Council

The Minnesota Private College Council has presented a variety of programs on KTCA-TV through the Minnesota Private College Hour. A thirty-five week series of evening programs corresponding to the academic year were broadcast beginning in 1957 through 1963-64. Fifteen colleges have participated in this project with each college responsible for programming at an allotted time using faculty members for presentation. This program is currently offered for a half hour rather than an hour and is no longer sponsored by the Minnesota Private College Council but continues with several private colleges participating on an individual basis.

An area studies program was offered by the Council as part of the Minnesota Private College Hour and was in operation for a number of years under a Hill Foundation grant. This was a joint effort of four of the colleges. While some schools still broadcast programs of this nature, this course is no longer offered as a project of the Council.

Another program sponsored by the Council as a part of their hour was an economics course with seven colleges participating. This course was originally shown on Channel 2 during the day in 1961-62 as an inter-institutional class for credit. A Macalester College professor was the television instructor of the basic course in macro-and micro-economics. Funding was provided through a Hill Foundation grant. A re-run of the course was shown in the evening, available for credit to the general public.

In some instances courses were offered on the Private College Hour for credit, but generally this program was seen by the participating institutions as a public service effort.

KTCA-TV Telecourse in Nursing

In order to offer diploma programs in hospital schools of nursing it has been necessary for these schools to make arrangements for course work at the college level. Difficulties in obtaining necessary courses at local colleges and universities led to the development in 1962 of a program of televised instruction available at each of the participating schools for first year nursing students. This arrangement has apparently proved very satisfactory as courses are provided at a lower credit hour cost and the availability of the class at the hospital eliminates costly student transportation charges.

Eight courses are currently being offered on video tape for freshman nursing. Courses used are taught by faculty from various colleges and universities across the country. The curriculum is discussed by a faculty committee from participating schools and final decisions are the responsibility of a coordinating council and the director of the KTCA program who is a nurse educator. A television instructor is available for individual conferences as well as for giving examinations, keeping records, and grading papers. In addition, a television associate conducts a one-hour "follow-up" class each week at each participating institution.

These courses are a joint effort of the four Twin Cities area diploma nursing programs and KTCA-TV, but other schools which meet accreditation requirements and which are within the signal range of the station may participate through special contractual arrangements. Course usage has been expanded by the rental of the video tapes to diploma schools of nursing in other states. During the Fall of 1966, over 1,000 out-of-state students received this instruction.

Associated Colleges of the Midwest Video Tape Project

Use of a mobile television observation unit for the production of video tapes prepared as teacher training programs has been the result of a pilot project started in 1964 by the Associated Colleges of the Midwest (ACM). Tapes representing observation of three hundred hours of classroom activity have been used as a portion of classwork at Carleton and St. Olaf Colleges. This project, directed by a Carleton College professor, utilizes relatively low cost television equipment with use of video tape playback units. The pilot project was originally funded by a grant of $160,000 from the Charles F. Kettering Foundation with an additional $100,000 granted the following year. A proposal has been submitted to the Upper Midwest Regional Educational Laboratory for further development of this project.

Tri-College Television Council

The Tri-College Television Council coordinates the cooperative televised programs of Moorhead State College, Concordia College (Moorhead) and North Dakota State University in Fargo. The Council is composed of members from the educational institutions and representatives from the local ETV channel. Courses have been prepared by all of the participating institutions during their period of cooperation.

The usual difficulties that seem to accompany inter-institutional cooperation were increased by the difference in sessions among these schools. Concordia College operates under a trimester system and Moorhead State College and North Dakota State University operate under a quarter system. All begin and end at varying dates. The fact that Concordia College is supporting its own program of televised instruction, the freshman English project, and has not felt able to provide one-third of production costs for the three programs in 1966, in process.

University of Minnesota-IBM

A project to provide education programs through a duplex microwave interconnect by closed-circuit television from the University of Minnesota to Rochester originated in the Fall of 1966. One-way programming had started in 1964. These programs are relayed to the IBM Rochester plant and to the Rochester Junior College facility in the Midway Building. Courses which lead to graduate engineering degrees have been provided in higher mathematics, and in electrical and mechanical engineering subjects.

Efficient utilization of the facilities has fostered other courses of a more general interest, including business administration and humanities. These are usually offered evenings, and many courses are viewed on a credit basis at the Junior College facility.

The graduate engineering courses are supported by IBM to provide employees an opportunity for graduate study on a released time basis. The project is administered by the University of Minnesota, which leases lines from the Northwestern Bell Telephone Company for the inter-connect with the University. IBM funds the monthly fee of $3,080.00 for the leased lines.

Regional Library Teletype

The Dakota County Regional Library utilized, on an experimental basis, a teletype communication between the main library in West St. Paul and two branch libraries. This system was in use for eight to nine months at a flat charge of $183 per month with an additional cost of $1 for each message sent.

It was felt that the system was not financially feasible because of the limited use being made of it but would be advantageous for connection between various regional libraries or between a regional library and Twin Cities libraries. This system has been replaced by the use of an additional phone line for necessary communication at present. The Dakota County Library maintains radio communication with bookmobiles through towers located at Hastings.

The preceding materials represent a summary prepared by the staff of information that can be found in greater detail in General Appendix B.

Costs of Instructional Television

Evaluation of instructional television costs requires recognition of the differences among individual courses. As with conventional instruction, costs for one course are often quite different from those for another. An advanced course in chemistry, with its special laboratory materials, equipment and personnel, is likely to cost more than a beginning course in history which has a quite different set of special needs. For this reason, an average cost per student has much less meaning than might be wished, and often hides a considerable diversity.

Inter-institutional educational television costs also vary according to the number of enrolled students, number of participating institutions, number of instructors, amount of instructional time, amount of preparation time, salary of instructors, related materials, transmission costs, opportunities for playback or reuse.

While no two courses can be equated by a simple projection, experience can make possible some useful cost guidelines.

Tables 5 and 6 summarize the costs per student for the courses taught at Metropolitan Junior College. The "break-even point" (That point at which television instruction and conventional instruction costs the same) is shown in Figure 1. In the Metropolitan Junior College project, the point was at 55 students in the anthropology course and 108 students in the reading course.

In the experimental format used at Austin, the regular instructor viewed the tapes with the students with the result that the television

Table 5: MINNESOTA TELEVISION FEASIBILITY PROJECT METROPOLITAN
JUNIOR COLLEGE/UNIVERSITY OF MINNESOTA
READING AND VOCABULARY
PROJECTION: COST/QUARTER HOURS*

Number of Students	Quarter Hours	Total Cost	Cost/ Qtr Hr
25	125	$5,564.99	$44.51
50	250	5,739.74	22.96
75	375	5,914.49	15.77
100	500	6,089.24	12.18
125	625	6,263.99	10.02
150	750	6,438.74	8.58
175	875	6,613.49	7.56
200	1,000	6,788.24	6.79
225	1,125	6,962.99	6.19
250	1,250	7,137.74	5.71
275	1,375	7,312.49	5.32
300	1,500	7,487.24	4.99
325	1,625	7,651.99	4.71
350	1,750	7,836.74	4.48
365	1,825	7,941.59	4.35
375	1,875	8,011.49	4.27
400	2,000	8,186.24	4.09
425	2,125	8,360.99	3.93
450	2,250	8,535.74	3.79

* Cost per quarter hour is a term used to determine the cost of a particular course. One quarter hour equals one student times one credit hour, therefore, the number of quarter hours for a particular course is obtained by multiplying the number of students by the number of credit hours. The cost per quarter hour then, is obtained by simply dividing the total cost for the course by the number of quarter hours.

The cost projection curves in Figure 1 illustrate all factors for this project. In similar television interconnections, these curves would vary slightly with the introduction of new variables. Although most of these factors are stable in a cost projection, the number of teaching assistants may vary with the enrollment, thus raising the total cost with the addition of every teaching assistant. This graph was prepared using the assumption that an additional teaching assistant for every thirty-six students enrolled would be required. In calculating this additional cost for every teaching assistant, $6.99 for each student is added to the total cost in the Reading and Vocabulary course and $13.40 per student in Anthropology 2A.

Continued on Table 6

Table 6: MINNESOTA TELEVISION FEASIBILITY PROJECT METROPOLITAN
JUNIOR COLLEGE/UNIVERSITY OF MINNESOTA
ANTHROPOLOGY 2A
PROJECTION: COST/QUARTER HOURS

Number of Students	Quarter Hours	Total Cost	Cost/ Qtr. Hr.
25	125	$3,118.57	$24.94
50	250	3,118.57	12.47
62.5	312.5	3,118.57	9.90
72	360	3,118.57	8.66
75	375	3,158.77	8.42
87.5	437.5	3,326.27	7.60
100	500	3,493.77	6.99
125	625	3,828.77	6.13
150	750	4,163.77	5.55
175	875	4,498.77	5.14
200	1,000	4,833.77	4.83
225	1,125	5,168.77	4.59
250	1,250	5,503.77	4.40
275	1,375	5,838.77	4.24
300	1,500	6,173.77	4.11
350	1,750	6,843.77	3.91
400	2,000	7,513.77	3.76
450	2,250	8,183.77	3.64

The "institutional cost line" (the horizontal line showing the total cost per credit hour for each student) was $11.38 at the Metropolitan Junior College. The "break-even point" occurs when the cost per quarter hour curve crosses this line. At this number of students (break-even point) the cost of the televised course will equal the cost of conventional instruction. Certain standard costs must be met for every student in each course. These costs vary with the number of students in the course. Since this line represents a constant cost, a cost savings is experienced when television is utilized and the number of students passes the break-even point.

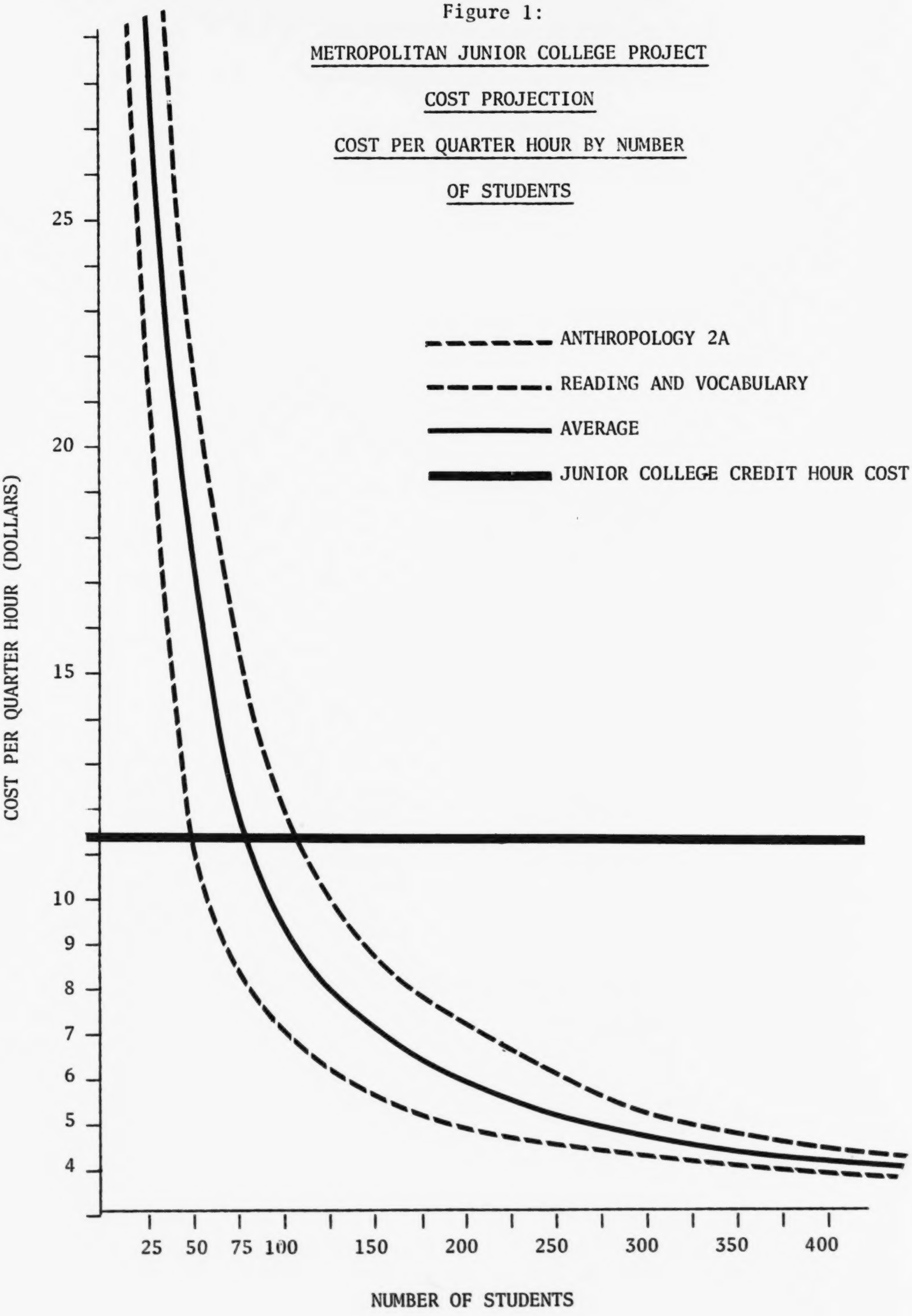
This project gives an actual dollar figure for the two courses but in practice several courses would probably be utilized on several campuses resulting in a combined average cost for all institutions.

Figure 1:

METROPOLITAN JUNIOR COLLEGE PROJECT

COST PROJECTION

COST PER QUARTER HOUR BY NUMBER OF STUDENTS



was in addition to the cost of conventional construction. This made it impossible to estimate the break-even point for the use of the televised course. As shown previously the costs of televised instruction on a per student basis is inversely related to the number of students ultimately receiving the instruction.

It is true, however, as shown in Table 7 and Figure 2, that this difference becomes less great when approximately 200 students are enrolled.

It is important to recognize, therefore, that economy can be achieved by presenting the course to large numbers of students simultaneously or by utilizing viedo tape playbacks to smaller numbers of students at different times.

Once the variables in a course are known through experience, it should be possible to determine the point where educational television is economically feasible.

The use of the anthropology course indicates that it may be desirable to present a televised course even when the costs are more than those for conventional instruction, particularly where an important course cannot be otherwise provided. The consideration of an inability to offer certain courses which may be important to students should be included in any discussion of costs. Surely the cost of not offering a needed course to students should be included in any discussion of feasibility.

It is also possible that a combination of a course with a low break-even point with one having a higher break-even point would permit both of

Table 7: MINNESOTA TELEVISION FEASIBILITY PROJECT AUSTIN JUNIOR COLLEGE/MANKATO STATE COLLEGE PROJECTION: COST/QUARTER HOURS

Number of Students	Day Qtr Hrs	Night Qrt Hrs	Total	Cost/Qtr Hr - Day	Cost/Qtr Hr - Both
25	50	12.5	62.5	$91.85	$73.48
50	100	25.0	125	45.92	36.74
60	120	30.0	150	38.27	30.62
75	150	37.5	187.5	30.62	24.49
100	200	50.0	250	22.96	18.37
125	250	62.5	312.5	18.37	14.70
150	300	75.0	375	15.31	12.25
175	350	87.5	437.5	13.12	10.50
200	400	100.0	500	11.48	9.18
250	500	125.0	625	9.18	7.35
300	600	150.0	750	7.65	6.12
350	700	175.0	875	6.56	5.25
400	800	200.0	1,000	5.74	4.59
450	900	225.0	1,125	5.10	4.08

TOTAL COST: $4,592.33

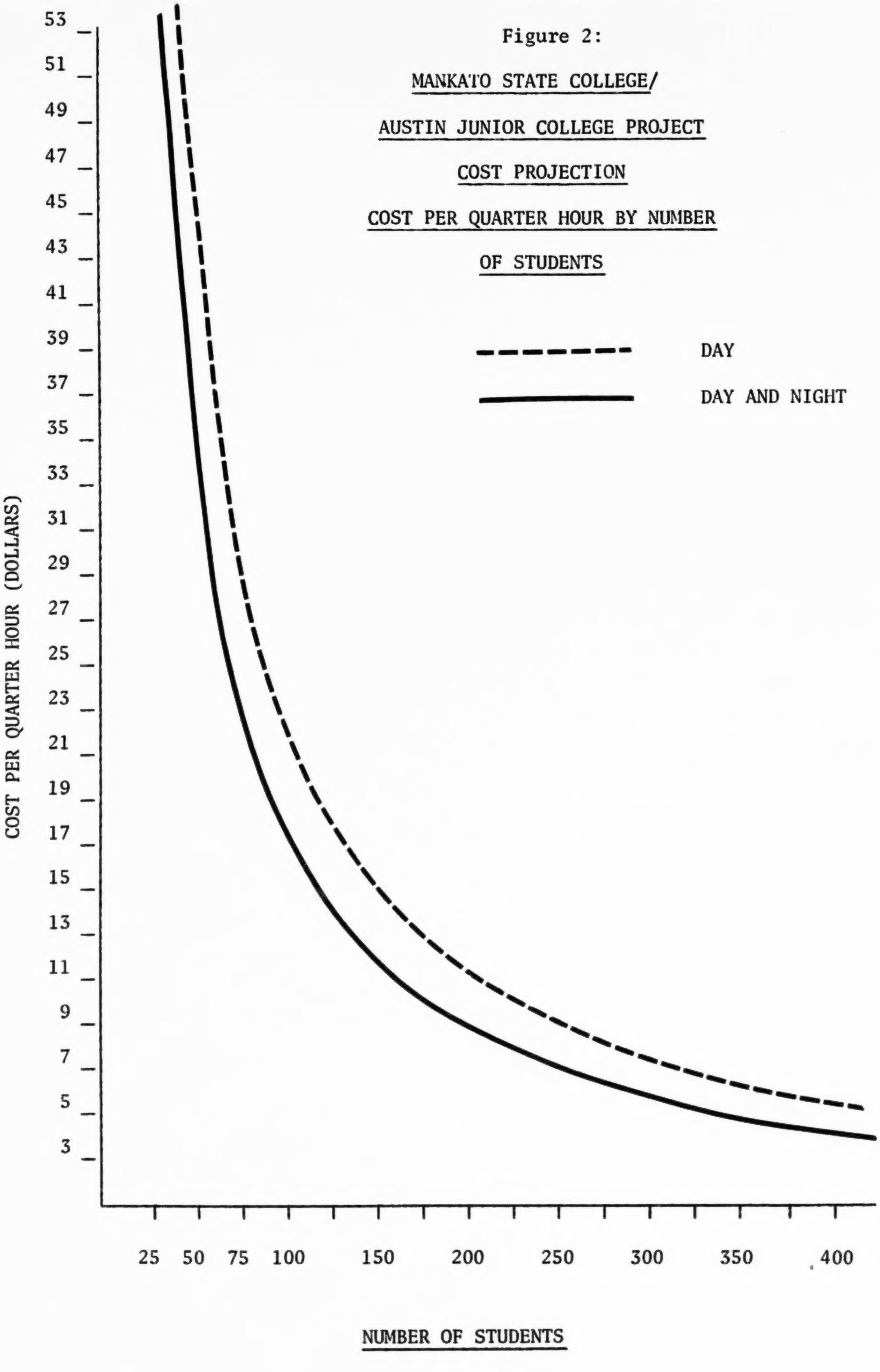


Figure 2:

MANKATO STATE COLLEGE/
AUSTIN JUNIOR COLLEGE PROJECT
COST PROJECTION
COST PER QUARTER HOUR BY NUMBER
OF STUDENTS

them to be economically feasible, as is shown in the Metropolitan Junior College project.

Because of the experimental character of the Study, other projects did not use full course offerings, so the costs must be thought of as supplemental to the normal costs of conventional instruction. Special materials with the possibility for playback become less costly with repeated use. Where televised instruction can provide materials which could not be provided in any other way, this fact must be weighed in any cost assessment.

The total cost of the projects in the Study follows:

Metropolitan Junior College-University of Minnesota (Includes $3,118.57 for Cultural Anthropology and $7,941.59 for General Reading and Vocabulary)	$11,060.16
Austin Junior College-Mankato State College	4,592.33
St. Cloud State College-Mankato State College	4,793.28
Rochester Junior College-Austin Junior College	15,819.90

It appears clear from the projects that inter-institutional educational television is economically feasible when sufficient numbers of students are involved.

Institutional and Academic Schedules

In the course of campus visitations, faculty members and administrators stressed the need for flexible systems of television which would serve their needs. They felt that educational television is most useful when it is adaptable to the needs of the institutions, and least suitable when it requires changes in the instructional program.

A number of considerations which make flexible scheduling necessary were identified: (1) block-scheduling of students according to year and academic goals is often necessary in order to provide students certain important educational experiences; (2) physical conditions, such as a divided campus, limited laboratory and eating areas or other special problems require that classes be scheduled to make maximum use of those facilities; (3) institutional scheduling sometimes must be related to the needs of the area served--its transportation system, related commuter problems, customary community time schedules, and so on.

These considerations, in the opinion of those visited, suggest that giving all students particular courses by either large conventional sections or by educational television, though an attractive idea, is often just not possible without doing violence to other areas of the instructional program. A scheduling arrangement providing that all freshmen take English at the same hour could leave the freshman chemistry, biology and physics laboratories unused at that hour.

Institutions also expressed a need in some instances to experiment with the academic calendar in order to develop new and more efficient ways of using the time of the student and the faculty.

It was noted at several institutions that there was a willingness to adjust schedules in order to use television when such use was clearly in the students' interest and when it would provide an important educational experience. This was particularly true when the content of the television material was of a current or of a simultaneous character that could only be provided at a certain time.

The willingness of faculty to make special accommodation for technology when it is in the best interest of the students was demonstrated in both the Metropolitan Junior College-University of Minnesota and Bemidji State College-Renown Properties projects. It was particularly evident in the Bemidji computer project. Here the instructor recognized that only a limited access was available during day time hours to the WATS line for use in interconnection with the Renown computer. (Bemidji State College and the district Highway Department in Bemidji share a state WATS line.) He suggested changes in the winter quarter class schedules to enable classes to meet in the evening hours when access to the WATS line would be available on virtually a full-time basis.

It would appear that when faculty see a direct benefit to students, they are willing to support changes in the instructional schedule. However, an attempt to adjust scheduling in order to bring two or more institutions into conformity only to accommodate a communications system would likely be regarded as an unnecessary disservice to the instructional program.

when the content of the television material was of a current or of a simultaneous character that could only be provided at a certain time.

The willingness of faculty to make special accommodation for technology when it is in the best interest of the students was demonstrated in both the Metropolitan Junior College-University of Minnesota and Bemidji State College-Renown Properties projects. It was particularly evident in the Bemidji computer project. Here the instructor recognized that only a limited access was available during day time hours to the WATS line for use in interconnection with the Renown computer. (Bemidji State College and the district Highway Department in Bemidji share a state WATS line.) He suggested changes in the winter quarter class schedules to enable classes to meet in the evening hours when access to the WATS line would be available on virtually a full-time basis.

It would appear that when faculty see a direct benefit to students, they are willing to support changes in the instructional schedule. However, an attempt to adjust scheduling in order to bring two or more institutions into conformity only to accommodate a communications system would likely be regarded as an unnecessary disservice to the instructional program.

Commissioned Papers

At the request of the Statewide Advisory Committee, background papers were commissioned which would aid the Feasibility Study in its evaluation of inter-institutional television. Nationally-known individuals with specific qualifications were asked to focus on different aspects of television communication. Of seven papers commissioned, six were executed. The completed studies deal with topics relating to the use of instructional television. These papers focus on specific problem areas ranging from faculty rights to technological developments. While the papers represent the opinions of the authors, they provide current information to those interested in the use of educational television. Copies of these papers may be found in General Appendix C. The following summaries of each paper were prepared by the Study staff.

Inter-Institutional Networks

A paper prepared by Glenn Starlin, Associate Dean of Liberal Arts, University of Oregon, traces the development of educational television and current developments in inter-institutional television.

The idea of using programs produced in major cities of the United States for use in other localities was established through the use of radio in this manner in the late 1920's. The advent of television in the late 1940's brought a new media to the public which made major use of network rather than local programming. There are those who felt that the development of educational network broadcasting would add to the value of educational television. However, television's potential for making informational and cultural materials available which would otherwise not be seen is particularly challenging to educators.

Educational Television Network Development

The development of network interconnections for educational radio or television which would make possible simultaneous transmission of informational and cultural programs has been limited by attitudes of local pride and some suspicion of materials prepared other than locally. Cooperation among stations and institutions has been primarily in the form of an exchange of service such as an early tape network development in radio made possible by the National Association of Educational Broadcasters with the aid of a foundation grant. Tapes of quality program series prepared by NAEB were made available by mail to member educational radio stations. A number of similar program services are now available for television programming as well. These developments have provided supplemental services to individual educational television stations.

A number of states are now developing systems for broadcasting with network interconnection, others are in the planning stages. Interconnection of these educational networks is planned to serve a variety of purposes. Representatives of the Ford Foundation and COMSAT (The Communications Satellite Corporation) have expressed interest in establishing a satellite based network on a national and international basis.

The Committee on Institutional Cooperation (CIC) composed of the Big Ten universities and the University of Chicago has discussed regional interconnection among the member institutions. The Inter-university Communications Council (EDUCOM) composed of a group of institutions of higher education is currently working to encourage a communications interconnection on a nation-wide basis to allow inter-institutional sharing of materials.

Inter-Institutional Television Utilization

While it is obvious that interconnection of educational institutions for instructional purposes is technically feasible, whether it is desirable administratively and operationally is harder to determine. Such uses as administrative conferences and transmission of special events would be acceptable on most campuses. However, when exchange of instructional materials is proposed, a number of questions must be considered.

The pattern of development at educational institutions has been one of individualistic and competitive pride thereby further complicating efforts at inter-institutional cooperation in general and particularly for instructional purposes.

The Oregon experiment from 1957 to 1965 which presented inter-institutional instruction by open-circuit television among institutions of higher education, according to Starlin, is considered a successful project, particularly in establishing the technical and administrative feasibility of inter-institutional educational television. Participation in the project was made possible through special efforts of the project director to involve faculty on several campuses during the eight-year period. When these special efforts were no longer encouraged, the project gradually declined and instructors have returned to traditional instructional methods and the use of closed-circuit television. Introduction of televised instruction at the college level in Oregon was made possible through the inter-institutional experiment and has been established as a successful medium of instruction in the form of closed-circuit television and through the use of telecourses on the educational television stations.

The Texas Educational Microwave Project (TEMP), another experimental project in the use of televised inter-institutional instruction has been broadcasting since 1959 and is currently offering four courses. It is hoped that increased financing and greater faculty participation will further expand the use of these programs in Texas.

In Florida, microwave interconnection of educational television stations was planned as part of a state network which would be utilized for upgrading junior college instruction. Plans for an interconnected state network have not materialized and the junior colleges have made use of tape recorded telecourses prepared initially to a great extent by the University of Florida. While most of the thirty junior colleges make some use of television in instruction, use has not reached the anticipated level.

It would seem that a review of the inter-institutional programs in these three states would indicate that a number of difficulties have yet to be overcome in inter-institutional cooperation, but that instructional television can be utilized among campuses by either closed- or open-circuit, or through the use of video tape recordings. However, both apathy and resistance have accompanied the use of inter-institutional television instruction.

Guidelines for Future Use of Inter-Institutional Television

Starlin feels that solutions to problems of surging enrollments, curricular innovation, physical plant expansion, adequate academic staffing demand consideration of potential uses of such media as television. He further outlines considerations that should be made when inter-institutional television is planned: (1) agreement by both faculty and administration on goals of the program; (2) assurance of strong administrative support without arbitrary pressures on faculty; (3) use of strong faculty committees; (4) appointment of effective coordinators, able to deal with varying types of problems; (5) cooperative selection of courses among larger and smaller institutions; (6) development of policy regarding faculty rights; (7) concern for student attitudes regarding televised courses; (8) development of a program of research and evaluation; (9) sufficient financial support to ensure quality materials and personnel.

While consideration of these factors as guidelines will aid in the utilization of inter-institutional programs the final outcome is dependent upon the acceptance of the media by administration, faculty and students.

New Communications Technology and Its Relationship to Instruction

The development of a communications system suitable to accommodate a variety of media and serving a number of functions is discussed in the paper prepared by John P. Witherspoon, Associate Director, Brooks Foundation, Riviera Campus. Mr. Witherspoon was formerly the Director of the Educational Communications System of the National Association of Educational Broadcasters. It is the view of the author that the establishment of a microwave system for the transmission of television signals between campuses should be considered as a broadband communication system rather than a television system with fringe benefits. Such a system could provide the capacity for transmission of televised instruction, digital data, radio, and other high quality audio services.

Communication Services

Broadcast-standard television with full speed data transmission requires six megacycles of bandwidth. As the television network does not require transmission facilities twenty-four hours a day, it would be possible to alternate computer data transmission which requires the same bandwidth. Studies have been made of techniques that would allow simultaneous transmission of data and television but are not perfected at this time. Audio services do not have a comparable requirement with FM utilizing only one four-hundredth as much bandwidth and telephone-quality audio needing even less. In addition to these services, a properly designed electronic communications system can also transmit graphic information by means of facsimile, slow-scan television and instantaneous reproduction of handwriting for use in the classroom.

State and Regional Systems

The Educational Communications System model for an intra-state system designed by a National Association of Educational Broadcasters study projects a plan for the State of Oregon where a state-owned microwave system presently provides interconnection of certain media on a limited basis. The model incorporates findings of the research phase of the study and seeks to further test communication requirements of institutions.

A recommendation has been made as the result of a study of the National Association of Educational Broadcasters that a multipurpose interconnection system be established in Iowa. The report recommends that the Legislature should set up, as an administering agency, a State Educational Communications Authority. It is reported that a proposal incorporating these recommendations will be considered by the coming session of the Iowa Legislature.

Studies of interconnection plans for multi-purpose use are being conducted in several states by universities. The State University of New York has developed a comprehensive interconnection plan which may eventually be linked with the Eastern Educational Network. A state plan for California has also been completed. However, as a number of other plans for interconnection in various sections of the state are being considered separately, the outcome is uncertain.

Computer Technology

While expanding computer technology will offer increasing opportunities for educational usage, the development of a multi-media plan must be so designed to allow future expansion. Utilization of computers by the academic community has been primarily limited to computational applications and the potential for library and information center use has yet to be realized. The copyright problem is of particular concern in the use of computers as vast amounts of materials can be programmed into the computer and reproduced on demand in smaller segments. As more use is made of this medium decisions concerning copyrights will need increasing attention.

Related Media

Once an adequate communications system has been established, Witherspoon cautions that consideration of specific uses for the many instructional needs must be studied to determine utilization of the resource needed in each case. Television is expensive and may not always be the appropriate answer. Colleges will want to consider uses of such developments as the electrowriter, an inexpensive device utilizing two voice grade telephone circuits for transmission of handwritten "blackboard" information between two locations, speaker phone techniques to allow students to participate in seminars held on another campus, language laboratories using audio alone, and a technique combining slow-scan or still picture television with high quality audio, providing a slide-presentation type of lecture, a much less expensive device than conventional television.

Regulations Affecting Use of Multi-Media

Regulations regarding the use of microwave frequencies and the legal tariffs of communication common carriers will need to be considered to determine more specifically the limitations of the future use of educational communications systems which utilize a multi-media approach such as that discussed in the paper. However, as it can be demonstrated that a multi-purpose system will utilize more efficiently the frequencies and provide diversified instructional tools, it would seem that discussions regarding necessary rule changes will be forthcoming. Adjustment of common carrier tariffs will present the most difficulty as these are a combination of company policy and FCC policy and are based on a number of factors. At present, the common carriers have a policy of providing services for a fee rather than leasing facilities. While, for example, telephone companies can provide the services described in the paper they have been unwilling to provide them simultaneously but see them as individual services each assessed by an individual tariff.

Inter-Institutional Cooperation

The information explosion with its highly technical and increasingly expensive demands leads to the belief that cooperation among institutions will be needed. Many trends have been seen in recent years of cooperative efforts, some made possible through federally funded projects and others involving individual institutional efforts. The need for institutions to have access to a broader range of research results, library information, and sophisticated equipment has been a particular incentive for inter-institutional agreements. A well-designed communication system with the ability to provide assistance in a variety of ways can be invaluable as inter-institutional cooperation develops. Educational groups are now considering the use of communications technology on a regional, as well as national, basis.

Responsibilities, Rights, and Incentives for Faculty With Respect to Televised Instruction

A paper prepared by Charles J. McIntrye, Coordinator of Instructional Television, University of Illinois, discusses policies and practices affecting faculty concerned with the use of televised instruction.

Faculty rights, responsibilities and incentives are subjects of considerable interest and ferment. Presently, relevant policies are best characterized as being still in the process of development. Major inter-university projects have not so far codified policies, although some individual institutions have done so.

The principal issues and tentative recommendations are as follows:

I. Ownership. The consensus of opinion holds that if recorded televised instruction is prepared as a part of a professor's institutional duties, the recording is the property of the employing institution. This opinion is not universally held, however, and may some day be subject to testing in the courts.

II. Faculty Control. The apparent fact of institutional ownership notwithstanding, it is usually held that control of televised materials, insofar as academic policy is concerned, should be exercised by the faculty. This provision relates to such matters as course initiation and accreditation, course content and management, the right and obligation to revise materials, withdrawal of materials, conditions of use, and erasure of video tapes.

It is the faculty, in contrast to any other authority, which best understands the curricular and pedagogical needs of the students for whom they are responsible, and it is this concern for the best interest of the student which supports the necessity for academic control being retained by the faculty.

III. Compensation and Other Incentives. One of the principal barriers to acceptance and use of televised instruction on the part of the faculty is the general inadequacy of commonly available incentives.

The preparation of televised instruction is extremely difficult and time consuming. Most faculty seem to believe, probably correctly, that they can better use their time and effort in writing, research, consulting, and other professional activities which will be more rewarding in terms of promotion, recognition by peers, and money.

Therefore, careful attention must be given to the development of a realistic and adequate system of incentives, not only for those individuals preparing televised instruction, but also for the departments in which it is used.

IV. Council for Establishing Policy and Resolving Conflicts. The faculty should participate in the formation of policies regarding the conditions, the production, and the use of televised instruction. Furthermore, since televised instruction is a relatively new development in higher education, and strong differences of opinion in regard to rights, responsibilities, and incentives will almost inevitably arise, provision must be made for equitably resolving time. A council should be established for this purpose.

The Relationship of Elementary and Secondary Education to a State Communications Network Serving Higher Education

A paper prepared by Chester D. Babcock, Assistant State Superintendent of Public Instruction, Olympia, Washington, describes the evolution of education from the era of the "little red schoolhouse" with a teacher who has the entire responsibility for teaching all subjects at differing grade levels to present day use of specialized instructional technology. He presents a dramatic picture of changes in educational institutions. However, only a few years ago, it was observed that schools and colleges have hardly "scratched the surface in bringing into the educational process the technological revolution in communication which is shaking the very roots of modern society."

According to figures of the United States Department of Health, Education, and Welfare, approximately two-thirds of the students in schools and colleges in 1966 are in areas covered by educational television with a total of 126 stations scheduled to be on the air during the 1966 school year. Thirty-seven states have enacted educational television legislation with 32 states having commissions, boards or authorities for the management of television.

Effectiveness of Educational Television

Studies of various researchers concerning the effectiveness of educational television as an instructional medium generally conclude that televised teaching is as effective as conventional methods. Babcock considers television only a communication channel and feels that the effectiveness can only be determined by the content, methods and techniques of presentation and by its relationship to educational goals. He feels that the question "What contribution can ETV make to learning?" should replace the question of whether television can replace the classroom teacher.

The ability of television to bring a wide variety of real life experiences to the student, utilizing "all of the resources of sight and sound" present a unique educational opportunity.

Statewide Programming of Instructional Television

To be most beneficial for the use of elementary and secondary schools on a statewide basis, programming must consider specific needs of the various schools. Enrollment of the schools, facilities available both in the schools and in their community, as well as the availability of competent teachers should be a part of the consideration. Special regional interests, as in history and geography, may be a factor in the type of program desired. Scheduling television to accommodate a number of schools with varying daily class schedules may be one of the greatest problems in planning statewide instructional programs. School schedules vary according to length of school day, length of between-class periods, length of lunch periods and with regard to special arrangements of each school for school bussing. A new trend in scheduling complicates the picture even further. This plan schedules 26 to 28 modules or combinations each day varying from 15 minutes to two hours. It may be necessary to plan use of video tape recorders in order for many schools to use televised programs.

The use of National Educuational Television materials and filmed programs available from regional television libraries, as well as programs on tape from other educational television stations can be helpful to elementary and secondary schools.

Inservice Teacher Training

In order to minimize the use of obsolete techniques and materials by the classroom teacher, education of teachers has become a continuous process and an increasing concern of administrators. An added benefit can be gained through the use of instructional television in the form of inservice teacher training. New techniques and equipment used by a multi-media instructional program will also aid in training of teachers and in the training of "para-professionals" who assist the teacher in the classroom.

Inter-Institutional Television Operational Format

In developing an inter-institutional plan for institutions of higher education, it would seem essential to recommend that each major transmitting station in an operational plan should have complete studio facilities for program production, that the institutions shoul be interconnected, possibly by microwave, and that outlying areas whic cannot receive a signal should be served by the installation of translators. While this plan would serve many of the needs of higher education, Babcock points out that it would not necessarily meet the needs of the elementary and secondary schools.

The outstanding programs currently in use for elementary and secondary schools have been planned by school personnel using teachers from those schools.

Another operational question to consider when planning for the use of television by elementary and secondary schools in a statewide network is the question of the selection of the administering agency. Babcock recommends that this authority be vested in a state educationa television commission in order to represent factions involved--the elementary and secondary schools, higher education and the community at large.

Use of Copyrighted Material for Instruction Through Inter-Institutional Distribution by Television

Legal questions connected with the use of televised instructional materials transmitted over closed-circuit or broadcast television were considered in the paper prepared by Fred S. Siebert, Dean, College of Communication Arts of Michigan State University. Relating educational objectives as projected in the classroom to the use of electronic media presents new concepts with regard to legal ownership of ideas and information.

While ideas, as such, are not covered by copyright laws, the format in which they are presented may be protected under certain conditions. Changes in the Copyright Act of 1909 are currently under consideration by Congress in light of advances in modern technology.

Educational Uses Under Present Copyright Law

Under current law, excerpts from complete copyrighted works may be used for educational purposes. However, the definition of an excerpted work has been controversial. According to Siebert, accepted usage would include that portion of the copyrighted material "small enough not to lessen the return which the copyright proprietor might expect from the sale of the complete work." Complete copyrighted works used for educational purposes are subject to more stringent scrutiny.

The "fair use" policy allowing educational institutions a more liberal usage of copyrighted materials is more favorable toward utilization in the classroom or in live performances and becomes more restrictive when intra-and inter-institutional television using recorded materials is introduced. While legal experts differ on this point, Siebert's opinion is that an educational institution may record programs including complete literary or musical works, but may not record complete dramas, musical dramas, graphics, films, or film strips without permission of the copyright owner. No court test of these points are recorded.

At present, the original producer or performer of sound recordings is not protected by copyright laws. The copyright owner of the material appearing on the recording retains all rights.

Educational Uses of Copyrighted Materials Under Proposal Bill. Identical bills (H. R. 4347 and S. 1006) were presented to the 89th Congress that would significantly revise the 1909 Act currently in effect.

Proposed revisions provide more protection for the holder of the copyright and may tend to curtail educational uses of the "fair use" provisions. The House Judiciary Committee reported an amended bill out of committee in September. However, as Congress adjourned without further consideration of this bill it is unlikely that any action will take place in the near future.

The proposed legislation would not change provisions regarding use for educational purposes of excerpts of copyrighted materials. Live transmission may be made of complete copyrighted works by either broadcast or closed-circuit television except in the case of dramatic works.

A change is proposed regarding sound recordings of music or literary works, previously not covered by copyright law, which would include these works under the law. The bill would allow phonorecords to be used for instructional purposes with one recording for delayed broadcast allowable.

A time limit of six months after recording would be placed on the use of recorded programs containing copyrighted materials and only one copy could be legally reproduced. This copy must either be destroyed after the six months time limit or preserved for archival purposes.

A number of educational organizations formed an "ad hoc" committee on copyright revision after the introduction in Congress of the proposed bills. A number of amendments were recommended by this committee regarding--fair use, transmission to classrooms and recordings with the interest of edcuational institutions foremost in the recommendations. This committee has testified before subcommittees of the House and Senate, as well as meeting with the staff of the Copyright Office in an attempt to resolve issues concerning educational institutions.

Instructors may use excerpts from copyrighted materials in the preparation of supplementary materials for students but may not include complete works without copyright clearance.

Federal-State Relationships

"While we have only begun to understand how to utilize television for education, these actions along with others indicate the great weight accorded television as a force for human development. Television can be used for a great range of organized endeavors." These statements in a paper prepared by John W. Bystrom, Assistant to the Undersecretary for Educational Television, Department of Health, Education and Welfare, refer to recent interests expressed in educational television by such groups as the Ford Foundation and the Carnegie Corporation, as well as industrial and professional groups. Bystrom's paper deals with broadcast facilities for both non-commercial television and radio.

Current Status of Non-Commercial Broadcasting

Within a year it is expected that only the states of Alaska, Montana and Wyoming will be without educational television broadcast facilities.

The 124 ETV stations currently in operation in 38 states serve a potential audience of 140 million people. These stations are licensed to public schools, universities, state agencies and non-profit community corporations. In addition to open-circuit broadcast operations, closed-circuit systems are being used in increasing numbers.

Among the variety of functions performed by ETV, one-third of the programming is estimated to serve inschool instructional purposes and one-seventh is used for college level instruction. Some use of the medium is also made for adult extension and continuing education programs, inservice training for professional, municipal, and other government employees. Cultural and informational programs also provide services to the public at large.

Non-commercial radio stations present a "versatile and low cost method for providing knowledge in the home, car and place of work" but have not been extensively used, with only 312 stations now in operation. Almost half of these are low power, making them inadequate for serving instructional needs. In most cases they have not responded to technological and social changes. Initial installation and operating costs for an FM station serving up to 70 miles may cost one-twelfth as much as a television system meeting comparable needs. Nationwide educational television coverage would cost ten times the amount required for coverage by non-commercial radio. The FCC is currently reconsidering policies for licensing of educational radio systems.

Federal Policy as Related to Non-Profit Radio and Television. In order to control the problems accompanying unregulated use of the air waves, the Communications Act of 1934 delegated to the Federal Communications Commission the responsibility of assignments of radio frequencies. Through the years, the FCC has made various allocations of radio assignments for educational uses of AM, FM and for a special low powered station. While the use of radio has presented a low cost facility for educational institutions, development has been limited. This is due to the short range of transmission of the assigned frequencies and limited resources available for this type of programming.

A recent proposal of the FCC would modify policies for non-commercial assignments allocating long range FM stations which would allow statewide radio service in all states. Heavily populated urban areas would receive more than one assignment.

All television receivers shipped in interstate commerce after April 1964 are required to provide reception of channels 14 through 83 UHF and channels 2 through 13 VHF. As the majority of channels designated for educational television are in the UHF frequencies, this regulation should encourage further use of educational television.

A 1965 action of the FCC providing allocation for a substantial increase in the number of channels reserved for non-commercial television should provide a sound basis for further statewide development.

The Instructional Television Fixed Service (ITFS) was made available to institutions by the FCC as a means of providing more flexible scheduling of televised instruction than is possible with open-circuit broadcast. This system would allow up to 31 channels low power, limited transmission television to be assigned to one licensee with up to 5 of these in any given area.

A similar arrangement is now available in FM radio permitting multiplex operation of educational stations, allowing simultaneous programming on several sub-carrier channels.

Both of these systems are relatively low in cost, and are planned to answer special needs of instructional scheduling. The FM radio multiplex service can be received on all modified sets within range of the signal. The ITFS can only be received at fixed points by use of special antenna.

Statewide ETV and Radio Network

Educational television networks providing interconnection throughout the state are currently in operation or under construction in seventeen states. Bystrom points out that each of these states has attempted to tailor its system to specific needs. The need to "equalize and extend educational opportunity and improve quality" has probably been a consideration in many of the states. In other states, the need to promote economic development has been a factor.

For example, in Mississippi, the state ETV agency functions as an arm of the State Research and Development Center. Educational television and computer services will be shared by elements in the state concerned with development of both educational and economic resources.

Uses of educational television for providing trained manpower and for educational and cultural opportunities are of increasing importance.

In 44 states some type of formally designated State educational authority for the administration of education television exists.

Some of these are separate commissions and others are under state boards of education. Statewide educational radio is available only in Wisconsin. While radio requires more spectrum space, it provides a medium of communication comparatively low in cost of operation and construction of facilities. A two-way radio conference network is utilized at the Albany Medical College in New York providing communication to a 100,000 square mile area allowing faculties from 17 medical colleges to cooperate for instructional purposes with 60 hospitals. The use of radio for administrative communication through a multiplex system should be considered as an additional use in the future.

Federal Support for Research and Development

Federal funds for research and demonstration in the use of educational media have been provided under Title VII of the National Defense Education Act of 1958 (NDEA) (P. L. 78-665). One of the projects funded under Title VII resulted in the development of regional libraries of instructional materials available to educational television. Another Title VII grant awarded to the National Association of Educational Broadcasters studied problems of the shortage of trained manpower to meet the needs of educational television.

Many of the studies of effectiveness of televised instruction have been funded under Title VII grants.

Support from private non-profit foundations have also made an important contribution to educational television.

Federal Support of Broadcast Facilities

The Educational Television Facilities Act of 1962 (P. L. 87-447) first made possible federal funds for construction of new non-commercial facilities or for the expansion of existing stations. Over $12 million was funded in FY 1966 for this program of matching grants. Minnesota is among the states which have utilized the maximum allotment of one million dollars available to each state under the legislation. When the act became law only 63 stations were in operation; at the present time, 175 stations have been established.

Ten million dollars was allocated in FY 1966 under the Higher Education Act of 1965 (P. L. 89-329) for closed-circuit programming on ITFS equipment. Another bill which was passed in 1965, the Elementary and Secondary Act (P. L. 89-10), includes funding under Titles I and III for closed-circuit and ITFS wherever the projects fall within the goals of the legislation. Provisions are not made under this act for facilities. Funding deals primarily with programming with limited amounts for equipment.

Federal Funding for Innovation and Improvement

A number of other support programs designed to answer varying public needs have included project utilizing television. Such projects have been funded in the Department of Health, Education and Welfare, in agencies ranging from the Public Health Service to the Administration on Aging and in other departments. However, the use of educational television to provide information regarding basic individual problems and community needs in areas such as alcholism, juvenile delinquency, training of manpower in critical fields, has come primarily from private rather than public funds in the past. Recent legislation will increase the availability of federal monies.

State Telecommunication Planning

Planning for system developments in telecommunications should include evaluation of the types of services available, uses to be made of them, and whether to use leased common carrier services or user-owned microwave systems.

Cooperative use of communication systems on a statewide basis serving various agencies provides a more economical and efficient utilization of expensive facilities.

Many states have found that facilities leased from the telephone company answer their needs. In 27 states these services are provided at a commercial rate averaging approximately $4.00 per month per voice channel mile, while 19 states utilize State Telpak arrangements at costs which average between $1.00 to $1.50 per month and 12 states utilize Federal Telpak rates averaging 45¢ per month per voice channel mile.

Assistance in planning is available to the states through the Director of the Federal Office of Telecommunication Management. Funding assistance for communication facilities can be obtained from various federal agencies, among them the Office of Civil Defense, the Department of Commerce under the State Technical Services Act (P. L. 89-182) and a number of programs enacted in past years providing support for libraries.

A number of states have commissioned planning studies of telecommunications but only a few have actually carried out plans. The South Dakota communications study recommended "cooperative development of interconnection facilities for educational television and data processing services" providing usage by all state agencies.

A model system proposed for the CIC institutions in a study supported by an NDEA grant proposed the use of a multi-purpose interconnection system equipped for utilization of facsimile, slow scan television, telephone, radio, teletype, computer transmission and broadcast television.

A survey and report of a planned telecommunications utilization for Nebraska included all major departments of the state government. It was found that individual developments that would meet the requirements of each of these agencies would exceed $15 million but that facilities could be established on a joint use basis with funds currently allocated. Bystrom sees a well-planned telecommunications system, used intelligently, as contributing to the effectiveness of government services, the improvement of educational quality and the economic development of a state.

The preceding materials represent a summary prepared by the staff of information that can be found in greater detail in General Appendix C.

Educational Management Discussions

In the Spring of 1966, the Statewide Advisory Committee asked the staff to arrange for discussions among administrative heads of systems of education so that they might develop a recommendation to the Committee for the management of any inter-institutional television development that would result from the Study.

Pursuant to that request, Chancellor Bevington Reed, Executive Director Philip Helland, Commissioner Duane Mattheis and President

O. Meredith Wilson appointed representatives to develop a tentative document for them to review. In later discussions of those representatives, Mr. Richard Hawk, Executive Director of the Minnesota Liaison and Facilities Commission participated. Brother Josephus Gregory, representing the private colleges, also joined the administrative heads for their discussions of the tentative report.

The represenatives considered the management alternatives which seemed to be available: (1) creation of a special television commission in Minnesota; (2) assignment of management to an already existing unit of education, such as the Department of Education, University of Minnesota, or the State College Board; (3) assignment to the Minnesota Liaison and Facilities Commission; (4) assignment of management to the Twin City Area Educational Television Corporation or the Minnesota Educational Television Network; (5) assignment of the management responsibility to an informal committee, such as the Statewide Advisory Committee; (6) no assignment of management responsibility.

After consideration of the alternatives, it was unanimously determined that the Minnesota Liaison and Facilities Commission with its present role of coordination should assume responsibility for inter-institutional television. The specific recommendation was:

> "We, therefore, recommend that the Commission be assigned responsibility for such television developments. In assuming this new responsibility, the Commission would require professional staff, technical assistance, and an Advisory Committee composed of representatives of various participating institutions. Authority for allocations of such state and resulting federal monies for inter-institutional television facilities and programs as might become available to the Commission would be allocated by the Commission acting with the advice of the above mentioned Advisory Committee."

The management document also suggested that regional facilities be created for production at each of the state college and university campuses, and that there be access to these facilities for other educational institutions. The statement did not close out the use of present facilities or the creation of more production facilities in the future.

A statement indicating these decisions was developed and sent to the staff of the Inter-Institutional Feasibility Study.

Those recommendations were accepted by the Statewide Advisory Committee as one giving guidance to the work of the Committee. Subsequently, Chancellor Bevington Reed brought the statement to the attention of the presidents of each of the state colleges.

Representatives of KTCA-TV on the Statewide Committee indicated concern that the statement not be mis-interpreted as calling for the control of all educational television by the Commission. They noted that their principal concern was not with the substance of the document but rather with the clarity of its wording. These represenatives met with Study staff, and, from these discussions, another meeting of the administrative heads with a representative of the KTCA-TV Board was arranged. At that meeting were Dr. Philip Helland, Brother Josephus Gregory, Mr. Richard Hawk, Dr. Bevington Reed, Mr. Duane Mattheis, Dr. Donald K. Smith and Mr. Al Heckman. Dr. Paul H. Cashman and Mr. Edward McMahon also attended.

As a result of the meeting, several changes were made in the position statement. The changes did not alter the substance of recommendations listed above, but they did indicate that the statement was not intended as a blueprint for all educational television in Minnesota and recognized the valuable educational resource provided by the "not-for-profit" educational television stations. The final statement is included in General Appendix F.

Conclusions which appear to be warranted by the educational management conversations are as follows:

(1) The administrative leaders of education in Minnesota see the inter-institutional development of educational television as calling for inter-institutional management. They also see the Liaison and Facilities Commission as a means to be preferred over other alternatives.

(2) The administrative leaders of education in Minnesota believe that inter-institutional educational television will progress most satisfactorily if production facilities are provided at the major public four-year institutions in the state.

(3) The administrative leaders of education believe that television course materials should be treated in the same way as other course materials, with similar faculty responsibilities.

(4) The administrative leaders of education believe that inter-institutional educational television participation must be left to each institution to decide--that institutional educational judgments must be the same as for other kinds of inter-institutional cooperation.

The final document submitted by the administrative heads to the Study staff is the one which has served as a guide in the preparation of the management recommendations found in the report.